SCIENTIFIC AMERICAN

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ALASKA AND ITS RESOURCES.

To one whose attention has never been called to the fact, it seems rather surprising that San Francisco is on the meridian that divides the possessions of the United States into equal parts. The Alaskan archipelago extends as far to the west of San Francisco as Maine is east of it. We are furthermore not apt to realize that the coast line of Alaska exceeds that of the United States, and that its territory is equal in extent to the portion of the United States east of the Mississippi River. Its islands are some 1,100 in number, and its scenery is as grand and rugged, with its abrupt headlands, its gigantic ravines, its snow covered mountains and glaciers, and enormous rivers, as any on this continent. It has a population of about 32,000, only 3,000 of whom are whites.

The few towns that are to be found are scattered along the coast, and are principally trading and fishing stations. The most important is Sitka, formerly the seat of the Russian governor, and at that time called New Archangel. It has a population of about 1,500, and is the headquarters of the United States authorities. It has fortifications, magazines, and a magnetic observatory, and has a Greek church and bishop. It also boasts of a training school for Indian children, an illustration of which is given herewith. The influences of civilization have wrought a great change in the natives, who were formerly very turbulent and savage. The Indian school is well attended, and the effects of education and the missionary have already been felt. The Greek church, which we have reproduced with its dome and graceful minaret, is the most foreign feature of the town, and is in *fact* the *only edifice* that has any claim to being an architectural production.

The Russian block house, which is also illustrated, was formerly garrisoned with a Russian force, but it is now abandoned. On a rocky point near Sitka is situated the castle, which, in spite of its rugged walls and severe aspect, possesses its secrets and its romance. It was formerly the abode of a Russian princess who held sway in the Territory, and who was murdered in her own home in the midst of gay revels by a jealous admirer.

THE GREEK CHURCH AT SITKA.

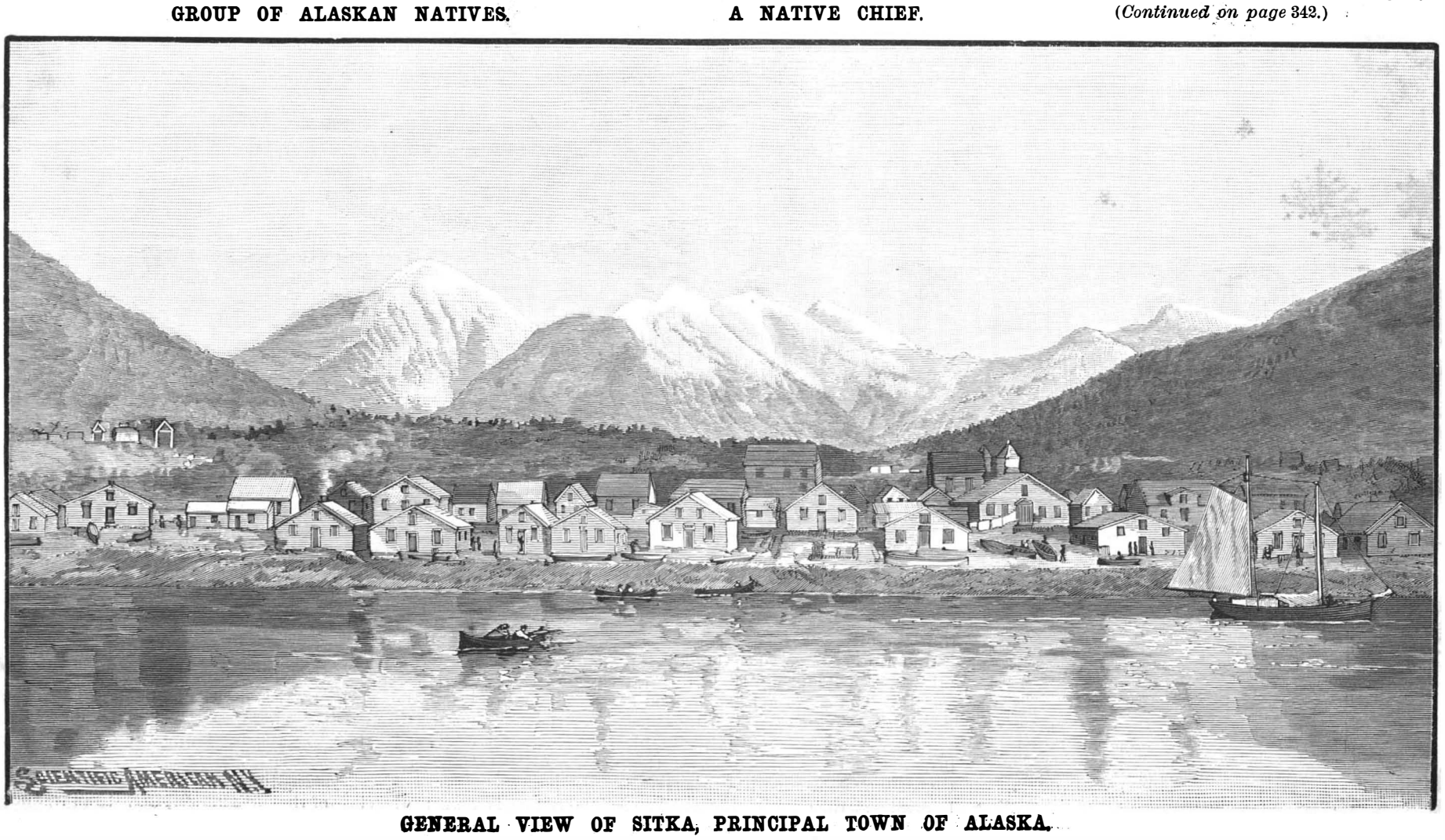
GROUP OF ALASKAN NATIVES.

A NATIVE CHIEF.

A portrait is reproduced of Kitch Konk, a native chief, in full dancing costume. His mantle is brilliantly colored, while in his hand he carries a rattle. A group of Alaskan ladies is also given. They are not in their war paint and best linen, but in their every-day clothes; while their faces are simply daubed with a mixture of spruce gum, grease, and lampblack, put on, it is said, to preserve the complexion.

One of the most curious practices of the natives is their method of disposing of the dead. The bodies of the departed are cremated and deposited in log houses, which are surmounted by some carved object in wood, which is supposed to guard the ashes of the deceased whose bones lie beneath. One might mistake the creature in the accompany-

(*Continued on page* 342.)



GENERAL VIEW OF SITKA, PRINCIPAL TOWN OF ALASKA.

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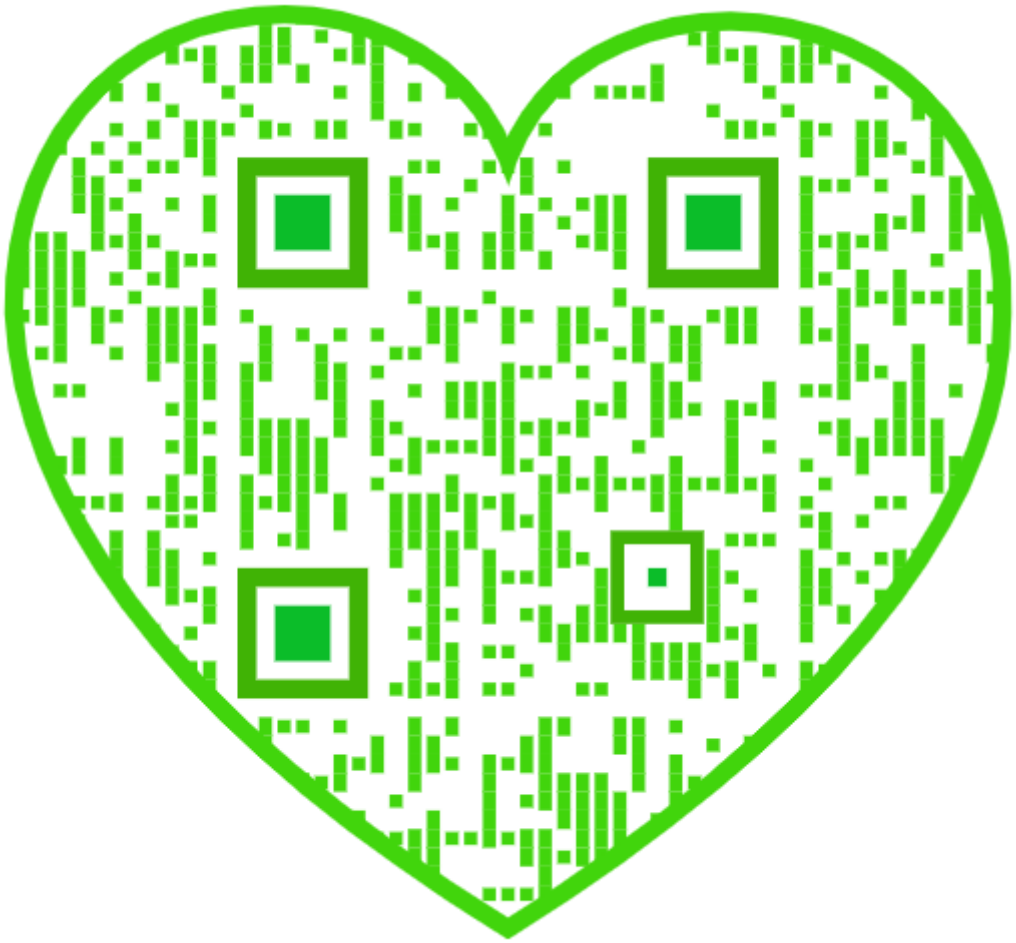

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THE NEW STEAMSHIP AUGUSTA VICTORIA.

The new Augusta Victoria, of the Hamburg-American steam packet line, reached this port on May 19 on her first trip, making very fast time. From Southampton to Sandy Hook her time was 7 days 2 hours and 30 minutes. This is equal to 6 days 8 hours and 30 minutes from Fastnet. The longest day's run was made on May 17—464 knots. The Cunard steamer Etruria left Queenstown a day later and arrived at the bar of New York harbor several hours behind the Augusta Victoria. On account of the greater distance traveled, the new ship went about as fast as the famous Cunarder.

The Augusta Victoria is a steel ship and was built at Stettin, Germany, by the Vulcan Shipbuilding Company. She is 460 feet long, 56 feet beam, and 38 feet depth of hold. She has three smokestacks of elliptical section, and is propelled by twin screws. Each screw is driven by a triple expansion engine; 12,500 horse power is developed by both together; 220 tons of coal are burned in a day. The two engines are independent. She carries only three masts, with fore and aft rigging. The ship is thoroughly protected by longitudinal as well as by transverse bulkheads. The longitudinal bulkhead runs from stem to stern and from keel to upper deck. The bottom is double and divided into chambers that can be filled with water and emptied at will, so as to modify the draught or trim of the ship. The rudder is of unusual size and is moved by steam. The saloons and staterooms are lighted by incandescent electric lamps. The decorations are very lavish, and the utmost luxury characterizes the saloons, music-rooms, and other divisions. The staterooms are unusually large and well provided.

On her trial trip the speed of 20 knots was attained. She was launched on December 1, 1888, and soon will have a companion in the Columbia, now approaching completion at Birkenhead, near Liverpool, England. She is of special interest from the fact that she is of German build, and her record will be watched with great interest. A short time before the Augusta Victoria was built, the Vulcan works had completed the last of the twin screw cruisers for the Chinese navy, which by their performance greatly added to their reputation.

TALK OF DISMANTLING THE FORTS.

The abandoning of most of England's fortified stations is a bold suggestion, and the leaving to means other than fortifications the coast defense of the country is a bolder one, yet both are made in all seriousness, and stoutly maintained, too, by one of her best authorities on modern warfare, Admiral Colomb, who, moreover, has a large following among military men. Of course, there is no dearth of authorities to espouse the other side, and vigorously, too, yet it is not going too far to say that the novel proposition is gaining more friends, the more it is discussed. Its effect on those considering it for the first time is a curious one, the first inclination being to ridicule it, as if it were on its very face an absurdity; a little more consideration, and the inclination is to regard it as an ingenious though a bold plan to enormously strengthen the Channel fleet, but not a practicable one. It is just here where the split comes, where various processes of reasoning lead to different goals; one following out the train of thought inspired to conviction, the other only the more sustained in his inherited belief that England's fleet should be scattered over the world.

Admiral Colomb and his *confreres* virtually ask what advantage it is to have fortified stations all over the world. For a base of supplies for the fleet? Well, then, if no fleet were kept there, no supplies would be needed, and consequently no fortifications.

A novel proposition this, and when carried to its conclusion it leaves a picture in the mind's eye of war fleets arriving in distant and hostile waters with no means of obtaining a fresh supply of coal and provisions. But the calculations that have been made show that since the introduction of steam on the sea there has not been an occasion where, during time of war, coaling stations could not be forcibly fortified. As it is, the greater part of England's fleet, often three-quarters of the number of effective ships—those out of the dockyards—are kept constantly in distant seas, and millions of dollars are spent yearly in keeping up military establishments in these far-away parts to supply them with coal and food. The best naval authorities have recently given it as their opinion that the Channel fleet should be more than equal to withstand the assault of the combined fleets of the two strongest naval powers. It never has been so, it is not so now, and, with the scattering of ships as under the present system, with the great powers constantly building, it is not likely to be so in the future.

Under the proposed system, it might be accomplished. Such a fleet might be recruited from the distant fortified coaling stations. The Admiral might have cited some well-known illustrations of the danger of dividing the forces; a notable one being the dispatch by Octavius of the best troops on a distant expedition against the barbarians while the enemy was knocking at the gates of Rome. The Admiral's idea is that, when war threatened, a dash was to be made in the direction of its probable operations, and refitting stations fortified and provisioned there, thus saving the expense of a long list of fortifications in foreign waters. As to temporary troubles in time of peace, this very steam system, which many think requires fortified coaling stations, permits the quick dispatch of an effective force.

As to the system of immense and costly shore fortifications, both he and many others of the best military minds regard them as unnecessary and ineffective. Even the iron and steel plates now being spread along their seaward faces are regarded as impotent against the assault of the great marine guns. Such fortifications make too large a target, so it is said, all that is wanted being a platform of iron or masonry, with no obstacle in the path of projectiles from the sea, and a group of deep pits to contain disappearing guns. If these and other suggestions relative to armament and processes be adopted, there will take place something like a revolution in the present system of warfare.

POSITION OF THE PLANETS IN JUNE.

JUPITER

is morning star until the 24th, and after that time evening star. On the 24th, at 2 h. P. M., he is in opposition with the sun, the most interesting epoch in his course. This superb planet is then in his best estate for terrestrial observation, being nearest to the earth, rising at sunset, and continuing visible the entire night. He wins the highest planetary honors during the month, though Venus surpasses him in brilliancy when, in the early morning hours, she appears above the horizon. Jupiter approaching opposition will richly reward observation, as he comes darting above the southeastern horizon earlier every evening and growing brighter until his culmination is reached on the 24th. His great southern declination is a drawback to the brilliancy of his appearance, and shortens the time of his stay above the horizon. Jupiter rises on the 1st at 9 h. 5 m. P. M. On the 30th, he sets at 4 h. 2 m. A. M. His diameter on the 1st is 43".8, and he is in the constellation Sagittarius.

VENUS

is morning star. She reaches her period of greatest brilliancy as morning star on the 5th at 9 h. P. M. This event occurs about 36 days after inferior conjunction, when she is about 40° west of the sun, and when about one-quarter of her illumined disk is turned toward the earth. She will be fair to see in the small hours of the June mornings as she anticipates the coming of the sun. Keen-eyed observers may follow her course after sunrise, when, shorn of her golden glow, she appears like a point of intense whiteness. Venus rises on the 1st at 2 h. 44 m. A. M. On the 30th, she rises at 1 h. 43 m. A. M. Her diameter on the 1st is 40".6, and she is in the constellation Aries.

SATURN

is evening star. He is still visible in the west, and is slowly approaching Regulus, the bright star that has been his neighbor during the winter and spring. Saturn sets on the 1st at 11 h. 29 m. P. M. On the 30th he sets at 9 h. 43 m. P. M. His diameter on the 1st is 16".4, and he is in the constellation Cancer.

MERCURY

is evening star until the 19th, and then becomes morning star. He is in inferior conjunction with the sun on the 19th, when, passing to the sun's western side, he commences his course as morning star. His conditions for observation are so exceptionally favorable that he continues to be visible on the first week of the month to the naked eye, setting on the 1st nearly an hour and three-quarters after the sun. Mercury sets on the 1st at 8 h. 55 m. P. M. On the 30th, he rises at 3 h. 43 m. A. M. His diameter on the 1st is 9".6, and he is in the constellation Gemini.

MARS

is evening star until the 17th, and then becomes morning star. He is in conjunction with the sun on the 17th, when, appearing on his western side, he commences his approach to the earth and the much looked for opposition of 1890. His progress is so slow that he will be invisible for some time to come. Mars sets on the 1st at 7 h. 41 m. P. M. On the 31st, he rises at 4 h. 11 m. A. M. His diameter on the 1st is 4", and he is in the constellation Taurus.

URANUS

is evening star. He may be found a little distance north of Spica, by the unaided eye or with the aid of an opera glass. He sets on the 1st at 1 h. 58 m. A. M. On the 30th, he sets at 12 h. 3 m. A. M. His diameter on the 1st is 3".8, and he is in the constellation Virgo.

NEPTUNE

is morning star. He rises on the 1st at 4 h. 5 m. A. M. On the 30th he rises at 2 h. 14 m. A. M. His diameter on the 1st is 2".5, and he is in the constellation Taurus.

Mars, Mercury, Neptune, and Venus are morning stars at the close of the month. Jupiter, Uranus, and Saturn are evening stars.

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Caterpillars Occupy a Railway.

A correspondent of the New York *World* gives an amusing account of trouble recently experienced on a new section of railway in Maine, between Sebois and Brownville.

The advance guard was seen by a railroad timekeeper as he rode over the line on his velocipede the night before. He encountered a lot of small gray caterpillars which had spread themselves over the track so thickly that he had to push his machine along by hand for half a mile. A big engine and eleven flat cars, loaded with 1,500 ship knees, the Canadian Pacific's first train for business, started from Sebois for Brownville on the morning of May 19. It had gone but a few miles when it ran into a sticky, squirming mass, which the locomotive wheels ground to a greasy pulp that clogged the driving wheels and prevented them from getting any grip on the track. It was as if wheels and rails had been thoroughly larded. The train came to a standstill, and the conductor and engineer made an investigation.

"Pooh!" said the engineer, "bugs!"

"Ha, ha," laughed the conductor derisively.

They jumped aboard after a little scraping and tried to start again, but it was no use. The "bugs" were too much for them. As far as the eye could reach, the little caterpillars were in complete possession of the track. The Canadian Pacific was turned into two lines of gray wriggle. The train was in the midst of the woods.

"Cut bushes and try to sweep them off," said the conductor to the train men. All hands tried it, but the bushes crushed the pulpy mass and only smeared the track worse than ever. Sand was then sprinkled on the rails. This enabled the engine to start, but the caterpillars soon greased the ties again and the train halted. A messenger was dispatched to the Sebois station, and the situation telegraphed to the manager of the road. He sent an extra locomotive and a crew of helpers to the assistance of the beleaguered train. With a force of men scraping and sanding, with an engine to pull and another to push, the train crept through the woods at a snail's pace.

And now, queerly enough, a new enemy rallied to the support of the caterpillars. A vast horde of large and ferocious mosquitoes came out of the depths of the forest and assailed the motley crew of railroad men, showing no national predilections, but drawing blood from Poles, Frenchmen, Russians and Irishmen alike. Even a bishop would have smiled to see the crowd fighting mosquitoes with one hand and caterpillars with the other, all the time swearing in at least five different languages! Supt. Van Zile issued the orders, and charge after charge was made at the steep grades lubricated with squeezed caterpillars. All day long and after the sun had gone down, the locomotives and men toiled to drag that train from Sebois to Brownville. The myriads of caterpillars covered the rails for eleven miles. When the train reached its destination at last it bore the most exhausted and disgusted crew ever seen outside of a blizzard.

The Value of an Idea.

The value of little inventions has had a singular proof or manifestation lately in the great run on "pigs in clover," a puzzle that has, we venture to say, been seen by nearly all our readers, for it has already made its way everywhere. Mr. C. M. Crandall, the inventor of this toy, says that for twenty years past he has had his mind on the availability of the rolling of marbles for a toy, and that in his model room the first experiment with the "pigs" took the form of a table, two feet in diameter, on a ball and socket joint. This was soon reduced to the hand toy now so familiar, of which 300 gross have been turned out daily for some time, while the demand has not yet been met by the supply. Mr. Crandall is a prolific inventor of toys, but it will be noted that it was twenty years before he evolved this last popular novelty in practical form. His perseverance and his success should give encouragement to other inventors, many of whom are at this very moment working upon new ideas of at least equal worth and utility. In the field of electricity alone, there is room for scores of Crandalls, who in some way or other are to hit the needs and fancies of the public. One does not look for the invention of such great novelties as the telegraph, the telephone, the electric light, and the electric motor every day of the week; but electrical improvements and devices, as trivial and as valuable as "pigs in clover," may be arrived at endlessly, and are not to be despised.—*The Electrical World.*

Rock Drills and Compressors.

The Rand Drill Company, of New York City, in their catalogue for 1889, have succeeded in giving a large amount of information relative to the drilling and excavation of ore and rock by machinery. It has many interesting and valuable illustrations of important engineering works, as well as those more particularly showing the operation of drills and compressors, with details of the tools and machinery employed. It is a large octavo of 195 pages, and is sent free to all who ask for it.

The First Electrical Execution.

The purchase of three dynamos and other appliances for our New York State prisons inaugurates the planning for the first execution by electricity, and William Kemmler, of Buffalo, may claim the distinction of being the first person ever sentenced to be thus executed.

The sentence was pronounced by Judge Childs in these words: "The sentence of the court is that for the crime of murder in the first degree, whereof you stand convicted, within the week commencing on Monday, the 24th day of June, 1889, and within the walls of Auburn State prison, or within the yard or inclosure adjoining thereto, you suffer the punishment of death, to be inflicted by the application of electricity as provided by the Code of Criminal Procedure of the State of New York, and that in the mean time you be removed to and, until the infliction of such punishment, be kept in solitary confinement in said Auburn State prison."

The death warrant in the case is directed to the warden of Auburn prison, and provides that the sentence be executed "upon some day within the week commencing Monday, the 24th day of June, in the year of our Lord 1889, and within the walls of Auburn State prison, or within the yard or inclosure adjoining thereto, by then and there causing to pass through the body of him, the said William Kemmler, a current of electricity of sufficient intensity to cause death, and that the application of such current of electricity be continued until said William Kemmler be dead."

The result of this novel method of execution of criminals will be watched with interest from all parts of the world.

Interesting Scientific Exhibits.

At the recent conversazione of the Royal Society at Burlington House, given by Professor G. G. Stokes, M.A., president, among the scientific objects of interest exhibited was a new adjunct to the optical lantern, invented by Mr. Eric S. Bruce, and called by him the "electro-graphoscope." It consisted of a white lath about an inch wide and 18 in. long, which was made to rotate windmill fashion by an electro-magnetic motor; a picture then thrown on the rotating lath by the magic lantern was visible in its entirety, on the principle of the retention of vision; the background some distance behind the lath was also visible, hence the picture cast by the lantern, which was one representing a statue, seemed to stand out in midair.

Mr. A. W. Clayden exhibited a shallow vessel containing water, with projecting flat horizontal pieces of zinc shaped to represent Europe and America, while the water represented the oceans. Then, by means of a dozen or more small pipes, jets of air were blown over the water in such a manner that all the trade and other regular winds were thus represented; the result was that the surface of the water took up motions representing the Gulf Stream, the cold current flowing down the coast of Labrador, and that other actual oceanic currents were imitated.

In an experiment shown by Mr. Shelford Bidwell, a bar of iron, which has undergone certain preliminary treatment, is placed close to a small reflecting magnetometer. When the iron is illuminated by an oxy-hydrogen lamp, it instantly deflects the magnetometer needle, as is evidenced by the movement of the spot of light upon the scale; and when the illumination is cut off, the spot of light at once goes back. The preparation of the iron consists in first magnetizing it by a current of electricity passed through a surrounding coil, and then very perfectly demagnetizing it by a reversed current of suitable strength. Its magnetic condition is thus rendered unstable, and its susceptibility appears to be greater for a small magnetizing force acting in the same direction as that by which the bar was at first magnetized than for an equal small force in the opposite direction. In the experiment the end of the iron rod was about half an inch from the end of the suspended magnetometer needle; the bar of iron was 6 in. long and ½ in. in diameter. The whole of the bar was illuminated to produce the deflection. The instrument was so sensitive that it was affected by the iron in the wheels of cabs moving in the court yard outside; the disturbance was not due to the vibrations of the ground set up by the cabs.

Mr. J. W. Swan exhibited a Gramme ring, rotating under the influence of the magnetism of the earth. Within a shallow circular brass box, about five inches in diameter, twenty little coils of insulated wire were disposed near the circumference; each coil consisted of 400 turns of wire, making 8,000 turns altogether. The resistance of the coil when the current was split was forty or fifty ohms, the current passing in the ring was about half an ampere. This ring was free to turn on a vertical pivot, and continued to turn steadily, under the influence of the magnetism of the earth.

Mr. H. Brereton Baker performed some curious experiments, as follows, on non-combustion in dried oxygen: 1. Charcoal was heated to redness in dried oxygen without any visible combustion. The oxygen had been in contact with the drying agent for two months. 2. Sulphur was distilled in oxygen dried by phosphorus pentoxide for five years; no flame was seen. In moist oxygen, sulphur burns at a temperature of 320°; its boiling point is 440°. 3. Phosphorus was distilled in oxygen dried in the same way; it boils at 290°. In moist oxygen it catches fire at about 60°. 4. Ordinary phosphorus, he said, is not luminous at any pressure in dried oxygen.

Captain H. Capel L. Holden exhibited a chronograph for measuring the velocity of projectiles and small periods of time. Mr. William Crookes exhibited a great photographic map of the solar spectrum, taken by means of a Rowland's grating. Mr. C. V. Boys exhibited some useful applications of fibers of quartz. Professor J. W. Judd exhibited specimens of Egyptian blue recently made by Professor Fouque, who discovered the ancient coloring matter to consist chiefly of silicate of lime and silicate of copper. Mr. Killingworth Hedges exhibited an automatic safety device for use in connection with electric light circuits when alternating current transformers are employed.

Aphasia and Apraxia.

In an extremely interesting paper read before the New York Academy of Medicine, Dr. M. Allen Starr enters fully into the varieties of aphasia and apraxia, and gives valuable practical directions for the examination of persons presenting these symptoms.

To examine an aphasic thoroughly it is necessary to test:

1st. The power to recall the spoken or written name of objects seen, heard, handled, tasted, or smelt.

2d. The power to understand speech and musical tunes.

3d. The power to understand printed or written words.

4th. The power to speak voluntarily. Does he talk clearly? Does he mispronounce words? Does he misplace words? Does he talk jargon?

5th. The power to repeat a word after another.

6th. The power to read aloud. Does he understand what he reads?

7th. The power to write voluntarily. Can he read what he has written?

8th. The power to write at dictation.

9th. The power to copy.

10th. The power to recognize the use of objects seen, heard, felt, tasted, or smelt.

By apraxia is meant the inability to recognize the use or import of an object, and it includes the conditions first described as blindness of mind and deafness of mind. The variety known as blindness of mind is that most commonly found. The first example of its successful treatment by operation is recorded by MacEwen, of Glasgow, in the *British Medical Journal* for August 11, 1888. A man who had received an injury a year previously to his applying for treatment suffered from deep melancholy and strong homicidal tendencies, which were relieved by paroxysms of pain in the head. There were no motor phenomena, but it was discovered that immediately after the accident, and for two weeks subsequently, he had suffered from psychical blindness.

Physically he could see, but what he saw conveyed no impression to his mind. An object presented itself before him, which he could not make out; but when this object emitted sounds of the human voice, he at once recognized it to be a man. In attempting to read he saw what he considered must be letters and words, but they were unknown symbols to him; they conveyed no impression of their meaning; the memory of their signs was gone; it was a sealed book to him. These phenomena gave the key to the hidden lesion in the brain. On operation the angular gyrus was exposed, and it was found that a portion of the internal table of the skull had been detached from the outer and had exercised pressure on the posterior portion of the supramarginal convolutions, while a corner of it had penetrated and lay embedded in the anterior portion of the angular gyrus. Removal of the bone resulted in complete recovery from the pain and mental symptoms.

The variety of apraxia known as deafness of mind has recently been studied by Oppenheim ("Charite Annalen, XIII., 1888), of Berlin, who noticed that while some aphasics retain their musical faculties, others may lose the power to follow melodies, to appreciate music, or to hear or sing the tunes which they formerly knew.

To test for apraxia it is only necessary to present various objects to a person in various ways and notice whether he gives evidence of recognition. Aphasia occurs without apraxia, but apraxia cannot occur except in connection with some form of aphasia.—*Medical Record.*

The Eastward Ocean Record Broken.

The City of Paris left New York on May 15 and reached Queenstown in 6 days and 29 minutes. This beats the Etruria's best eastward passage of 6 days 4 hours and 40 minutes and the Umbria's best eastward passage of 6 days 2 hours and 22 minutes. Up to the present time these had stood as records unequaled by any other ship. The City of Paris now heads the list for speed both eastward and westward. Her longest day's run on this last voyage was 476 knots.

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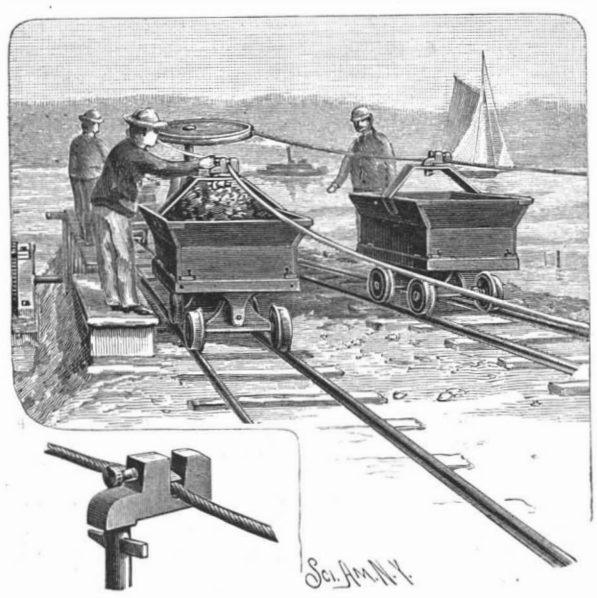
AN IMPROVED GRIP FOR TRAMWAYS, ETC.

A device whereby carriages or cars may be readily propelled upon a track from a suspended cable, and affording a simple and effective lock whereby the cars or carriages may be conveniently and expeditiously attached to the cable or detached therefrom, is illustrated herewith, and has been patented by Mr. Elijah Dainty, of Coal Bluff, Penn. The power is furnished at either end of the proposed route of travel of the car by means of a shaft journaled in bearings below

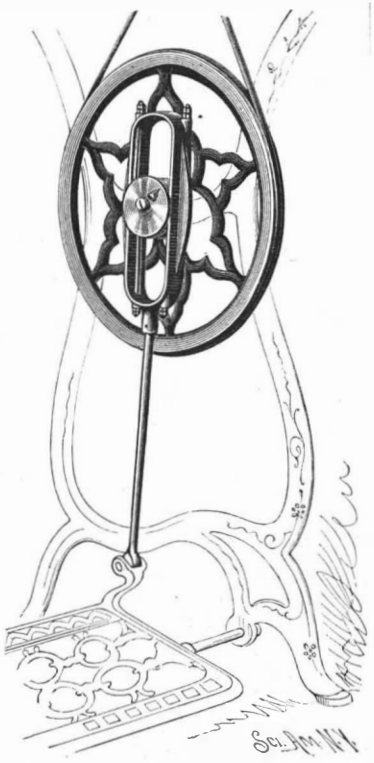


DAINTY'S GRIPPER FOR CABLES.

the track level, this shaft communicating motion to a vertical shaft carrying a horizontal cable pulley, which gives motion to an endless cable. The cars are provided with a transverse yoke or bail, upon the flattened upper surface of which a grip is swiveled, as shown in detail in the small view. This grip is provided with a handle, not shown, and means of locking it in a sidewise position to the line of travel of the cable, whereby the hold or grip is obtained by which the car is drawn along. In the upper part of the recess of the clamp by which the cable is engaged is a spring bolt or latch, to hold the cable in place when the travel is over uneven ground. A modification of this clamp is made, with rounded corners, to pass over rollers or sheaves on the ground when the power is applied by means of a cable running beneath the car.

AN IMPROVED MOTOR FOR LIGHT WORK.

A device whereby power may be conveniently transmitted for light running machines, such as sewing machines, etc., is illustrated herewith, and has been patented by Mr. William R. Bell, of No. 422 West Forty-fifth Street, New York City. The sleeve or shaft to be driven has recesses in which are pawls or friction devices, two rings being placed on the sleeve having internal ratchets when pawls are used, while bands are connected to the rings and to a frame, so that when the frame is moved downward one of the rings on the sleeve will move the balance wheel, while as the frame moves upward the other ring drives the balance wheel, the opposite pawls or friction device slipping over their respective rings alternately with the contrary movements. The bands are preferably of metal, and so arranged that any undue slack may be conveniently taken up. With this construction the slightest movement of the frame either way acts to drive the wheel.



BELL'S MOTOR.

The Fat of Ucuhuba.

This fat is of a yellowish brown, very consistent, of a peculiar aromatic odor, becoming disagreeable if heated. It is obtained from *Myristica surinamensis*. It contains about 10 per cent of oleic acid, the other ingredients being myristic acid, wax, resins, etc. It is an excellent material for the manufacture of candles.—*E. Valenta, in Zeitschrift fur Angewandte Chemie.*

The New Metal Found in Nickel and Cobalt.

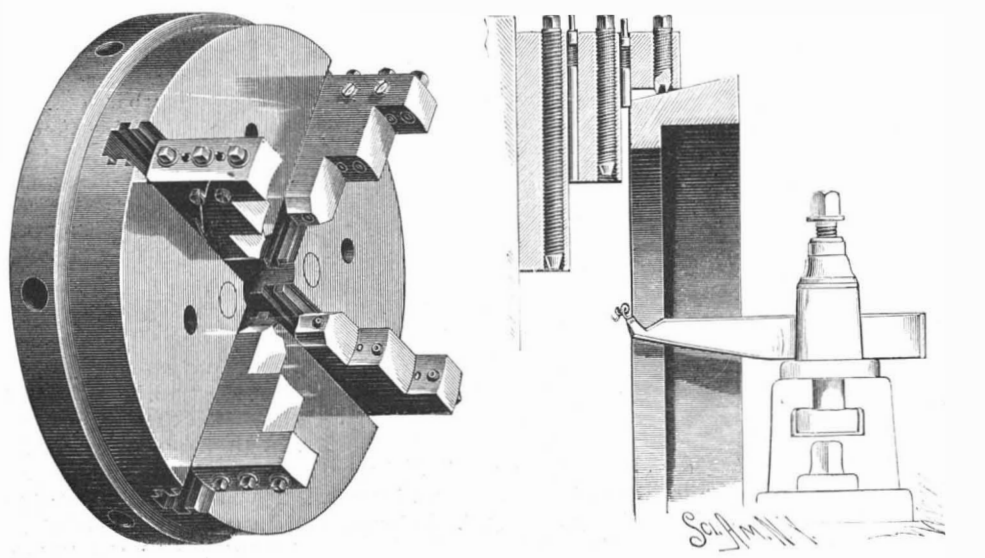
Kruss and Schmidt have discovered a new metal in both nickel and cobalt. These chemists had undertaken to determine the atomic mass of nickel and of cobalt, using for the purpose the pure material prepared by Zimmermann, the method of Winkler, and the atomic mass of gold as corrected by Kruss, 196·64. When the solution of sodium gold chloride was treated with metallic nickel or cobalt, the precipitated gold was found to be mixed with a small quantity of one or the other of these metals thrown down apparently by a secondary action. By dissolving the weighed precipitate in aqua regia, precipitating the gold with sulphur dioxide, subtracting its mass from that of the precipitate, the excess of nickel or cobalt was ascertained and allowed for. But still the method did not give concordant results.

Finally it was noticed that in washing the gold precipitate obtained by sulphur dioxide from a solution of a previous precipitate thrown down by cobalt, the red color of the filtrate, due to cobaltous chloride, became gradually paler, and finally acquired a pale greenish color. This portion of the wash water was collected and evaporated in a platinum dish, and left after ignition a slight residue, which dissolved in concentrated hydrogen chloride solution on warming, with a beautiful green color, the color disappearing on cooling. A similar result was obtained when nickel was used to precipitate the gold. A chloride solution was obtained on evaporating the wash water and dissolving in hydrogen chloride in which no nickel or other known element could be detected. In order to obtain a larger quantity of the new substance, nickel sulphide was treated with ammonium sulphide so long as the solution became brown. The new element became concentrated in the residue. So an increase of the new chloride in the mother liquors was obtained by crystallizing the double chloride of mercury nickel or mercury cobalt from a solution containing equivalent quantities of both chlorides. Finally it was observed that the new oxide was soluble in fused caustic alkali, in which cobalt and nickel oxides are insoluble; and thus it was obtained pure, 50 grammes nickel oxide yielding about 1 gramme of the white oxide.

Its properties are as follows: The acid chloride solution is not precipitable by hydrogen sulphide, but ammonium sulphide produces in neutral solutions a blackish sulphide. Ammonia throws down a voluminous white flocculent precipitate, not soluble in excess. Potassium hydrate acts similarly. On igniting the oxide moistened with cobalt solution, only a weak brown color results. Even after strong ignition, the oxide is soluble in the cold in a 27 per cent hydrogen chloride solution. With excess of acid, the chloride is green, but the neutral chloride is white and gives with water a colorless solution. The oxide does not change its weight when ignited in hydrogen. The metal can be obtained, however, by electrolyzing the chloride solution, or by reducing the chloride in a current of hydrogen. It is black, brownish-black in thin layers, dissolves readily in acids when produced electrolytically, more difficultly when produced at a high temperature. Further researches on the new metal are in progress by the authors.—*Ber. Berl. Chem. Ges.*, xxii., 11, *January*, 1889; *Amer. Jour. Sci.*

AN IMPROVED LATHE CHUCK.

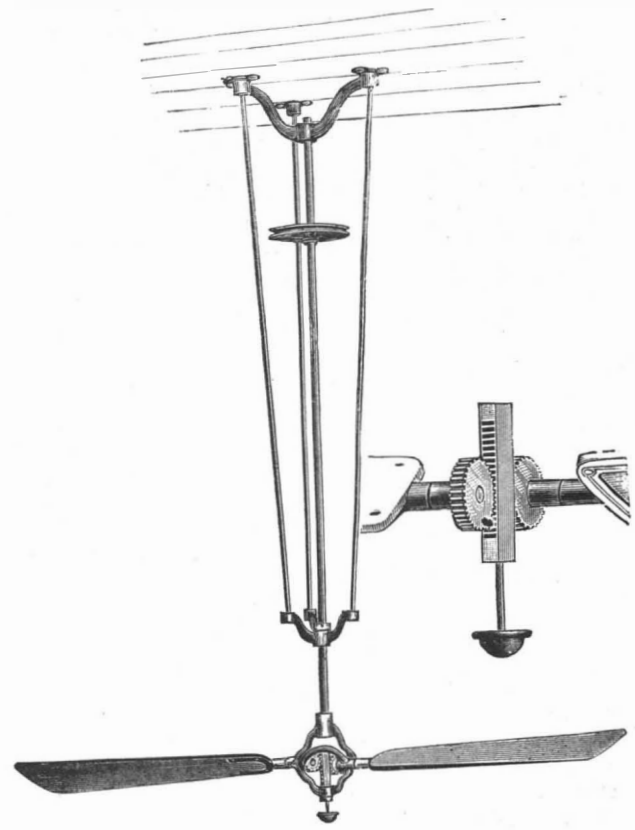
The illustration herewith represents an improvement in centering jaws for lathe chucks, which has been patented by Mr. Samuel Ide, of Medina, Orleans County, N. Y. One of the views is in perspective, and the other in longitudinal section, with the tool represented as cutting on the opposite side of the work from which it would be in practice, for better explaining the operation of the chuck. The chuck has one or more clamping screws with annular biting edges at their inner ends, the jaw having a series of steps or shoulders, and set screws working in threaded openings in the jaw and communicating with the vertical faces of the shoulders, while adjustable rods work in openings of the jaw on a level with the horizontal faces of its steps or shoulders, the set screws retaining the adjustable rods. When the work has to be bored entirely through, the rods are moved outward and interposed between the work and the bottoms of the shoulders, thereby holding the work out of contact, and preventing the point of the boring tool from defacing the jaws after passing through the work. One of the most valuable advantages of this improvement is that the chuck is designed to hold tapering work that the common chuck will not hold, while it is designed to hold all work more securely while the cutting tool is in operation.



IDE'S LATHE CHUCK.

THE NEW SYRACUSE FAN.

The accompanying illustration represents a fan, the blades or arms of which can be readily turned so as to displace more or less of the air of a room, or to throw the air upward or downward, as desired. It is manufactured by the Tuerk Water Meter Co., of Syracuse, N. Y. The view shows the fan as in operation suspended from a ceiling. The inner ends of the fans are provided with gears, between which a central bar or rack is interposed, as shown in Fig. 2, by moving which up or down, the angle at which the fans are set can be readily changed. This can be quickly done while the fan is in motion by taking hold of the pendent oil cup



THE NEW SYRACUSE FAN.

and moving the rack as desired. The company also supply these fans to be operated on standards, when they receive their power from beneath the floor, instead of from shafting overhead, in which case there is a small handle projecting from the side of the standard, by means of which the inclination of the fan blades can be regulated. The Syracuse Water Motor, also made by the above company, is recommended as affording a convenient means of running a series of such fans.

How to Make Ground Glass.

A writer on this subject says: I desired to have several pieces of ground glass, to use for some purpose. I first bought five cents worth of emery and two plates of glass of the size required. Spoiled negatives will answer, if they are cleaned, which can be done with a strong solution of lye. I placed one of the glasses on a flat board, and sprinkled a small quantity of emery on it, which I wetted with water. Placing the other glass on that, I ground them together, renewing the emery and water whenever necessary. In about one hour I had two of the finest quality of ground glasses, fully as good as those I would have to pay 75 cents for 8 by 10 size.

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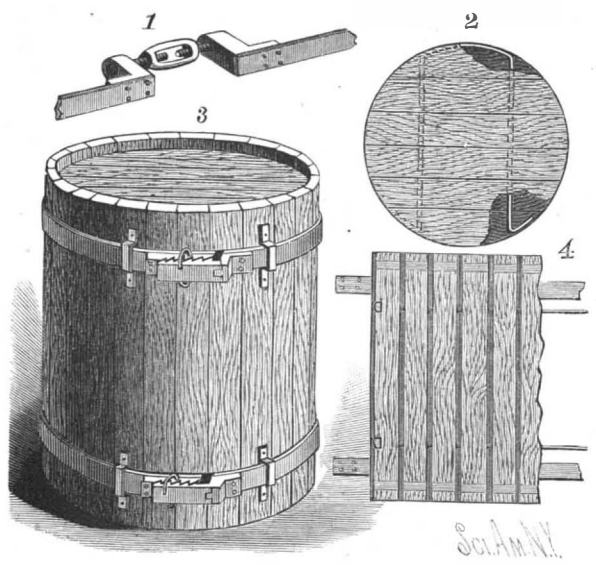
A COLLAPSIBLE SHIPPING CASK.

A convenient "knock-down" shipping cask which can be readily taken apart and put together, and returned in compact folded shape for a new shipment of goods, is illustrated herewith, and has been patented by Mr. John H. Mitchell, of Bloomfield, Iowa. Fig. 1 shows one of the hoops, with adjustable lengthening and shortening device, Fig. 2 is a bottom view of one of the heads partly broken away, Fig. 4 shows the means for connecting the staves, and Fig. 3 is a



MITCHELL'S COLLAPSIBLE SHIPPING CASK.

perspective view of the completed cask. The staves are connected together by wires extending through perforations, the vertical edges of the staves being beveled, so that when the cask is put together the edges of the staves will lie close together. The heads are formed of strips, also preferably connected together by wires extending through perforations in the strips, the wires having their ends bent and lying in grooves in opposite edges of the head. The staves have grooves at their top and bottom to receive the edges of the heads. Metallic hoops or bands are secured to the wired staves, when the latter have been folded about the heads by means of a serrated block riveted to one of the ends of each band, the other end of the band also having a block with serrated plate, their serrations engaging each other and being held by means of a wire passing through a staple and slot. When transported empty, the heads and wired staves are laid flat, and may be compactly folded together for convenient carriage.

Habits of Thalessa and Tremex.

Prof. Riley recently made some interesting remarks before the Biological Society of Washington on the habits of Thalessa and Tremex, illustrated by diagrams. The genus Thalessa includes our most remarkable Ichneumonid parasites, there being two species quite common in this country, the ovipositors in the female reaching sometimes over 5 inches beyond the tip of the body. They are among the largest parasites of the world, and have always attracted attention on account of this enormously long ovipositor. It has generally been supposed that the female bores into trees and stings some lignivorous larva, and particularly that of *Tremex columba*, and Packard, in his Guide, and Comstock, in the Standard Natural History, as also other authors, actually state this to be the fact. But from observations made in 1872 Prof. Riley proved clearly that the parasitic larvæ live externally on the Tremex larva and that the latter was never punctured or stung by the female Thalessa. The mode of oviposition is most curious. The female manages with some difficulty to bring the long ovipositor beneath the body so as to get its tip to the surface of the bark, bearing down upon it in such manner that the basal portion of the ovipositor rests within the tip of the abdomen and protrudes into a singular membrane between the sixth and seventh segments dorsally. The ovipositor makes a perfect coil within this membrane. The insect frequently gets stuck in the more solid wood and perishes in her endeavors to bore, and the fact that she does not reach the Tremex larva, and that she frequently bores into wood without reference to this last, has given rise to the belief among some entomologists that Thalessa may be lignivorous and not parasitic. Prof. Riley showed that this is impossible, not only by the nature of the mouth parts of the larva, which are incapable of gnawing the wood, but also by his actual observations, having found the parasitic larva of all sizes preying upon Tremex larva externally. He finally referred to some observations by Prof. J. A. Lintner, the State Entomologist of New York, who records having witnessed what he took to be *Thalessa lunator* ovipositing on external larvæ of the genus Datana. Prof. Riley showed by the structure of the ovipositor that this was impossible, and explained Prof. Lintner's error by assuming that he mistook another parasite, *Heteropelma datanæ*, and which is known to be parasitic upon larvæ of the genus Datana. The paper was a good illustration of the value of exact observations and of their need to dispel erroneous belief and conclusions, even in reference to some of our largest and most striking insects.

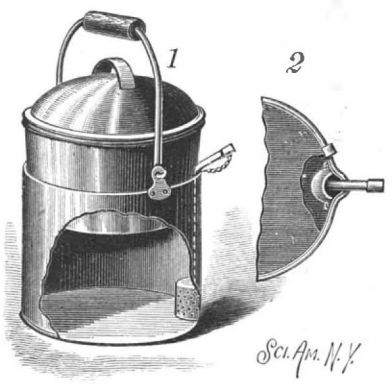
Fresh Boiled Water Necessary for a Good Cup of Tea.

All tea and coffee drinkers can tell by their taste if the water from which the beverage is made has not boiled or has boiled too much. Either of these conditions will spoil the flavor of the costliest tea or the best coffee berry. But not every one knows the reason or how to avoid the result.

The secret is in putting good fresh water into a clean kettle already warm and setting it to boil quickly, then taking it right off to use in tea, coffee, and other drinks before it is spoiled. If the water is allowed to steam and simmer and evaporate till all the good of the water is in the air, and the lime and iron and dregs left in the kettle, you must not expect a well flavored cup of tea or coffee.

AN IMPROVED DINNER PAIL.

The accompanying representation of a liquid receptacle, which also supports a lunch can, with a pipe extending from the outside to the bottom of the receptacle, forms the subject of a patent issued to Mr. John H. Yarnell, of Somerset, Ohio. The liquid receptacle has lugs near its upper end for supporting the bail, and in the upper end of the receptacle is held a lunch can or box, leaving a space in the bottom for coffee, milk, or other liquid. A pipe, adapted to turn in suitable bearings, extends down through a crease or groove in the side of the receptacle, its lower end extending into a strainer in the bottom of the receptacle, while its upper end has an outwardly bent part, forming a spout, which can be turned and held in place on the side of the lunch can by means of a hook on the latter. Fig. 2 is a plan view of the dinner pail on the line of the spout. The strainer is removable, for convenience in cleaning the parts when desired, and the user is not compelled to remove the lunch can when wishing to take a drink from the receptacle.

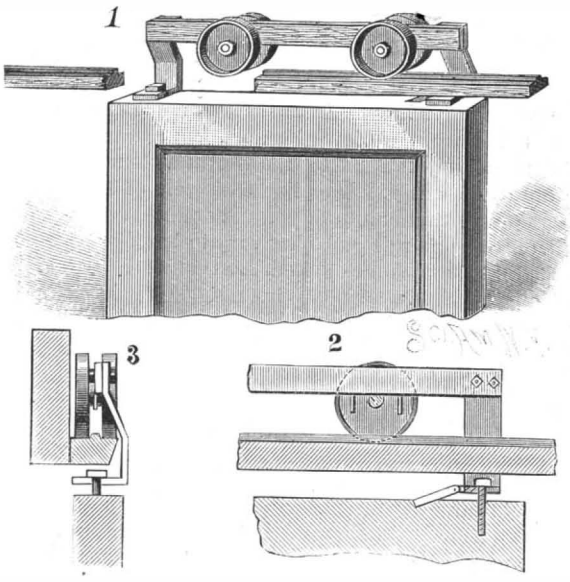


YARNELL'S DINNER PAIL.

HOUSES in which the inmates complain of headache and have a languid feeling are probably wrong in a sanitary sense. The condition of the premises should be examined.

AN IMPROVED DOOR HANGER.

An improvement in connection with sliding doors, providing a simple method of attaching the door and holding it in place, and conveniently adjusting it, is illustrated herewith, and has been patented by Mr. Wilber W. Smith, of No. 180 Second Avenue, Grand Rapids, Mich. Fig. 1 shows a partial side elevation of a door on which this hanger is employed, Fig. 2 a partial longitudinal, and Fig. 3 a partial vertical and transverse section. Screws with rectangular heads



SMITH'S DOOR HANGER.

are secured in the upper edge of the door, these screws holding in position brackets which at their upper end are secured to a horizontal hanger bar. On the under edge of this bar are spaced pins, as shown in Fig. 2, to limit the play of the trucks, designed to roll upon the usual horizontal track below. The trucks each consist of two wheels united by a common axle, on which rides the hanger bar. This mechanism may be readily attached to and detached from the door at will, and when the door is slid backward or forward, the trucks are designed to move noiselessly upon their tracks.

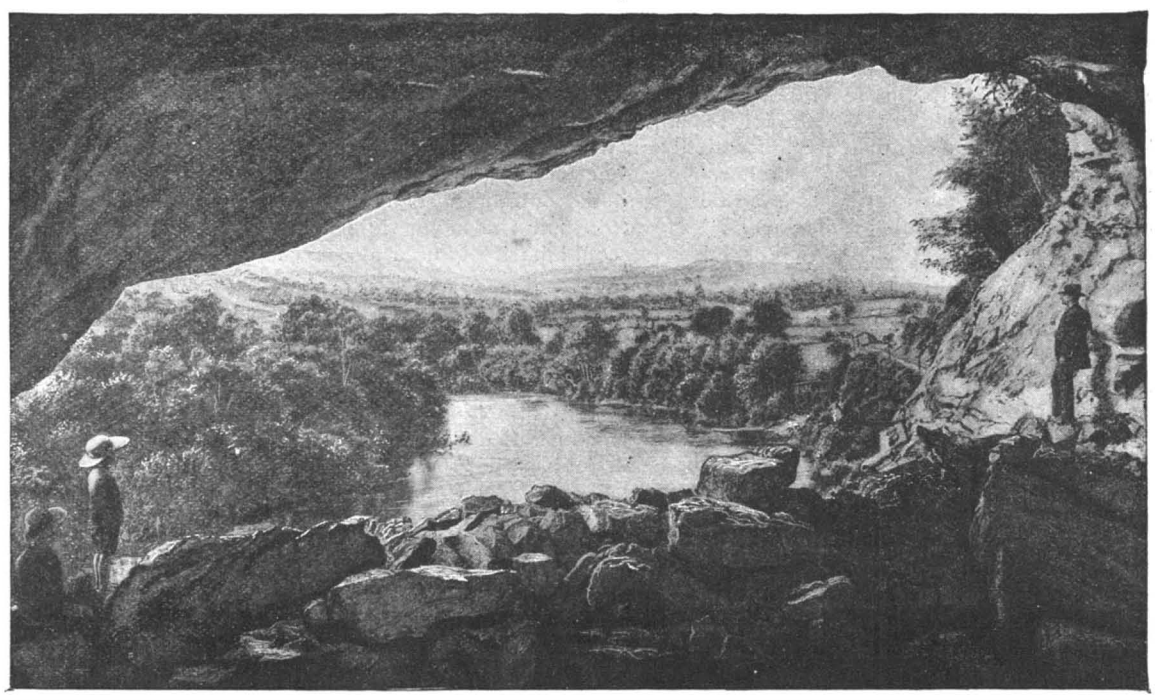
THE JEWELL CAVERN.

BY H. C. HOVEY.

The source of the Greenbrier river is at the base of the Cheat and Greenbrier mountains, West Virginia, more than 2,000 feet above tide level. The stream is 100 yards wide where it empties into the New river; that point being 1,325 feet above the level of the sea. Thus it falls about 700 feet in 100 miles, having many beautiful cascades and rapids. The entire valley is covered by a thick deposit of limestone resting on sandstone. It abounds in abrupt cliffs, alternating with deep ravines and gorges, which rise to what are called "levels" of considerable size. In these upper areas there are numerous sink holes through which the surface water finds its way to underground channels. Quite large streams are sometimes thus lost to view. A branch of Greenbrier river is known as Sinking creek before it passes under a large hill, and Muddy creek after it has emerged below. The region is evidently favorable for the formation of caverns—a fact noticed by President Jefferson, who, in his "Notes on Virginia," mentions that there are at least fifty in this one valley. Some of them yielded large quantities of saltpeter during the war of 1812; the product from a single cave being 10,000 pounds in one year. It was in one of these places that Jefferson found his famous megalonyx.

Orders were given to Captain Jewell, in the employ of the Chesapeake and Ohio Railroad, to cut down the face of a rocky cliff that juts out over the Greenbrier river, at a point five miles east of Alderson and a mile and a half west of Fort Spring. In the discharge of this duty, a few months ago, he found that, after cutting through an extremely compact stratum of black limestone, serving as an exterior shell, the rock that remained was in a singularly broken condition. On clearing the fragments away, there was suddenly exposed to view the hitherto hidden gateway of a cave of large dimensions, which has been appropriately named, for its discoverer, "The Jewell Cavern."

At the request of parties interested in developing the resources of Western Virginia, I recently visited the locality, supplied with the means for making a



THE JEWELL CAVERN, FORT SPRING, WEST VIRGINIA, GREENBRIER RIVER.

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somewhat careful exploration; and accompanied by Mr. Harry A. House, a photographer.

The trip itself was delightful; including a passage on the Old Dominion line of steamers from New York to Norfolk, followed by a ride through the diversified scenery traversed by the Chesapeake and Ohio Railroad, with the further privilege of stopping over, here and there, to inspect interesting geological formations. Rising from the areas occupied by the more recent periods, we climb the hilly belt of Silurian rocks that extends entirely across Virginia from northeast to southwest, and from which have been carved the Natural Bridge, the caverns of Luray, and numerous other grottoes that have been repeatedly described, but that never lose their interest for the man of science or the lover of the picturesque. Above these tower the Alleghanies, with their Laurentian, Huronian, and Montalban crags. One has a surfeit of the tunnels that pierce these mountains. There are twenty-six in all, on this one railroad, that vary in length from 100 ft. to 6,800 ft., and some of them are remarkable specimens of engineering. One of them, 1,200 ft. long, is just beyond Fort Spring; after shooting through which, we soon come in full view of the majestic entrance to the Jewell Cavern. I never saw a more striking approach to any cave. The graceful bend of the river, which is here deep and wide, the sweep of the lofty hills and more distant mountain chains, the fertile farms and woodlands intervening, and then the bold cliff cut by the wide arch of the cavern mouth, make an unequaled combination. When the cave was first found, the effect was heightened by an array of huge stalactites standing forth like so many tusks. But these, and many other curious formations, have been broken off and carried away to decorate the door yards and hallways of the neighboring hamlets. Car load after car load have thus been removed, until the more accessible portions have been literally robbed of their stalactitic beauty. There are fine masses of dripstone, however, in the remoter chambers that remain intact, probably because it was too much trouble for the vandals to rob them. Possibly much of this lamentable spoliation might have been prevented had not the ownership of the cavern been a matter of dispute. The entrance is on ground belonging to the railroad; but its ramifications undoubtedly extend under the farm of Mr. D. Y. Huddlestun. Even now it would be well worth while for these parties to agree on some plan for preserving what remains, both for their own interest and for the welfare of the public.

The mouth of the cave is 40 ft. wide and 30 ft. high. The vestibule is 50 ft. deep; and what might be called the throat of the cave—a narrow and irregular aperture—is to the left, as you go in. It bears the musical name of the "Magnolia Gate." Just at this point, in a stratum of oolitic limestone, I found some excellent specimens of pentremites, crinoids, and other fossils, serving to determine the formation as sub-carboniferous and referable to the so-called "Umbral series" of the Virginia survey. This series here includes what are known as the Greenbrier limestones and shales; the latter being soft and readily decomposed, while the former vary remarkably in character, from kinds almost as hard as granite down to the oolitic variety already mentioned. On analysis the oolite shows 96·46 parts of carbonate of lime in 100, the small residue being merely clay and sand, with no sulphur, phosphorus, or iron. As may readily be seen, this is an excellent material for the manufacture of lime; for which purpose it is quarried near by, with good results.

By barometrical measurement, the entrance to Jewell's Cavern is 1,660 ft. above the level of the sea; and it is about 50 ft. above the level of the adjacent river. The crest of the hill is between 300 and 400 ft. high. The surrounding country is broken into hills and hollows, many of the latter being sink holes connected with underlying caverns. A ravine near by cuts the ridge down to the river's margin, but grows rapidly shallow as one ascends, and its course being transverse to the cavern axis, the idea is suggested that the ravine was itself once a cave whose roof fell in long ago. At the upper end I found well marked sinks plainly connected with the cavern below, though it might require a great deal of digging and blasting to force one's way through.

The general trend of the cave is from north to south. Such arms as branch to the west soon come to an end; but those to the east and southeast extend for a long way, and all further discoveries are to be looked for in that general direction. Going as directly as possible from the entrance to the extremity, the distance is about 3,000 feet; but one who should thread all the passageways would probably travel between two and three miles. The main cave, to which the name of Huddlestun Avenue is attached, is of ample dimensions; being from 10 to 40 ft. wide and from 5 to 100 ft. in height. The floor is encumbered with immense banks of red clay, some of which was washed in by the subterranean stream that inundates the cavern during the rainy season; but most of it may be regarded as the breaking down of the Greenbrier shales, to which cause Prof. Rogers attributes the surface clays of the region. In many parts of the cave the free use of the pick and shovel would facilitate progress. Here and there steps might be cut for the convenience of visitors. One or two places ought to be bridged. Thus, at comparatively slight expense, all the more interesting portions might be made accessible, and the locality would then become a place of resort for West Virginia, at least, and an interesting addition to the numberless attractions of the route.

At the foot of a steep descent called Slippery Hill, a large arm of the cavern begins that runs in a northeasterly direction, to which the name of Hovey's Avenue was given. At the time of our visit the floor was dry; but during a part of the year it is the bed of a rippling stream, that has formed, partly by erosion and partly by concretion, the prettiest imaginable ruffle-like dams across its channel. In several places deep pools remain. The general bed of the stream is composed of flat, oval pebbles, of a shining black mineral, which proved to be argillaceous ironstone. Large fragments of limestone have fallen from the roof; in some of which the water, aided by sand and pebbles, has cut numerous bowls, of which what is called "The Bird's Nest Rock" furnishes the most striking example. Al-Sirat is a natural arch, seeming slight enough for the passage of disembodied spirits, yet really strong enough to carry the men of flesh and bone safely over. It has an ugly look, however, as if fashioned expressly to drop too ambitious adventurers into the abyss below.

Other places to be noted in this avenue are the Hermit's Cell and Pluto's Chimney—a singular crevice communicating with the upper part of the main cave. The entire length of Hovey's Avenue is about 600 ft.; and as the channel is rapidly downward, it is certain that it leads to the river, and is the true outlet of the cavern. This is confirmed by the existence of a large spring on the margin of the river, and in line with the trend of this avenue.

Returning now to the foot of Slippery Hill, we observe with admiration an extensive enlargement called the Cyclopean Hall, where huge folds of rock hang from above in strange and fantastic forms. The imagination finds the heads of elephants, dragons, and other monstrous resemblances, which my artist tried to catch by the camera. We named the spot, just beyond this hall, Harry's Laboratory, because here the cave suddenly narrows, with convenient ledges overhanging a limpid pool, and offering other facilities for the mysterious processes of subterranean photography. Cavern conditions are quite peculiar. Experiments elsewhere in instantaneous photography by artificial light hardly prepare one for the absolute blackness of darkness prevailing in these rooms that have never for a moment been touched by sunlight. Then again the walls and most of the formations are of uniformly dark material, with only here and there any object of a yellow or cream color tint. The cavern atmosphere is naturally very pure and clear. But if any smoke is made, it may take hours, or even days, for it wholly to escape. We had, therefore, to find the points most desirable to be taken, fix our instruments, and get the proper focusing, with as little torchlight as possible. For the most part we relied on coach candles. We were annoyed daily by troops of visitors, who would insist on carrying big torches, each emitting its mass of smoke, and who would want to stand around and watch our operations. Finally, we got rid of this annoyance by circulating word through the neighborhood that, if they would keep entirely away from us till our last day there, we would reward them by a grand illumination with fireworks; but if they persisted in hindering us, there would be no display of pyrotechnics. The plan worked admirably, and we had the cavern to ourselves.

Having selected our point of view, and made ready for the exposure, our plan was to burn, first, several yards of magnesium ribbon, and then fire off six or more magnesium cartridges placed so as to secure as many details as would comport with a good general effect. Before disturbing the camera, the artist would take several duplicates, so as to have them to choose from. We also tried a mixture of green fire and magnesium dust; but with less satisfactory results. Our conclusion was that, on another visit, we should take with us portable cylinders and depend on the calcium light, which, while less vivid than the magnesium light, makes no smoke and could be freely used at less expense.

Just beyond the Laboratory is Bruce's Gallery, a spacious enlargement of the cavern; near which the main cave bends at a right angle, and presently subdivides; one arm going to the east, while the other leads to the southwest. Here is the largest pool that we found in the cavern, which is called Black Rock Lake, on account of the black pebbles that form its bed. In its waters we found eyeless crawfish (*Cambarus pellucidus*); and in nooks and crannies there were hundreds of wingless grasshoppers (*Handenœcus subterraneus*). These little "cave crickets," as they are commonly called, have eyes, but do not seem at all sensitive to the light. I held my candle within an inch of some of them, that did not stir. But at the least touch of their long, waving antennæ, they will scud away with the most comical agility; and when fairly boxed they will escape, if given the slightest opportunity.

By going under the Hanging Rock, and through a frowning gateway called the Portal of Erebus, we found another and smaller lake, whose farther margin could only be reached by climbing to an upper avenue joining the two arms of the cave, and then descending again. Fifth Avenue, as this is named, leads to a deep rift in the rocks, at whose upper end is a cascade, the musical murmur of which may be heard long before it comes into view. The rivulet that causes it unites with another flowing down the right arm of the cave, and these two feed the lakes below. Among interesting features in the vicinity may be mentioned a natural water clock, quite equal to the one so greatly admired by visitors to Mammoth Cave, and made in the same way, by a rill that trickles down into a concealed basin.

Proceeding a few paces further, we found the way obstructed by an enormous limestone ledge that must have shaken the hills when it toppled over. It is partly buried in the clay, but the portion in view and standing erect must be about forty feet high. Beyond Mount Ararat, as they call this eminence, a descending crevice curves away, first to the right and then to the left, to a lower chamber, where there are some fine stalactites. But still another path, leading through a region as wild as Chaos, trends to the northeast, and consequently away from the outside ravine formerly mentioned, and deeper into the hill. Pressing on between huge fragments, or under grotesque arches; pausing here and there to inspect some alabaster pillar, or to lower our lamps into some pit or crevice, we make our way to the remoter parts of the cave. After dragging our camera and other apparatus through a muddy and tortuous passage, we are rewarded by gaining access to a small but very ornate chamber, really the prettiest room in the whole cavern, which we named "Clara's Grotto." Cautiously continuing our explorations, we follow a creeping avenue lined with botryoidal stalagmites, reminding one of rich clusters of ripe grapes. Helen's Grotto comes next, a room studded with various forms of dripstone, in the center of which stands an alabaster pillar four feet high and surrounded by what resembles a mossy carpet. Of course some pagan has tried to demolish this marvelous creation; but his effort was happily unsuccessful. At a point not far beyond the way is completely blocked by an enormous stalagmite named by us Jefferson's Monument, in honor of the scientific statesman who was the first to call public attention to the wonderful series of caverns in the Greenbrier valley.

The estimated vertical distance from this terminal mass down to the lowest point yet explored is about 150 feet. Doubtless this cave has grand surprises yet in store for daring adventurers. The ample dimensions of the rooms thus far opened would agree with this idea. When, in keeping with our promise, we came to illuminate the Jewell Cavern from end to end, which we did on the last day of our visit, in the presence of a large party of delighted spectators, we ourselves were surprised at the revelation. The vastness of some of the arches reminded me of similar scenes in the great caves of Kentucky and Indiana, which this locality resembles more than it does the profusely ornamented grottoes in the Silurian limestone along the eastern slope of the Alleghanies.

Temperature observations with a Hicks thermometer showed: In the shade outside, 90°; at the mouth of the cave, 66°; at a point 100 ft. within, 56°; at all points further in, 54°; in the water of Black Rock Lake, 53°—a difference perhaps due to evaporation from the surface of the thermometer. It should be remarked that this agrees with the average temperature, as already determined by me, for Mammoth, Wyandot, Luray, and other American caverns, being doubtless the mean temperature of the crust of the earth in this latitude.

Our thanks are due to Supt. Fuller, Supt. Dill, Mr. L. W. Bruce, and Messrs. Jewell and Huddlestun for favors granted.

A Glib-Talking Fakir.

A contemporary describes the lingo of a fakir the writer came across the other day following in the wake of Forepaugh's circus. The same fellow will be found at our country fairs next fall. His talk was as constant as the flow from Niagara; no period, colon, semicolon, or comma: "Yesterday I sold this almost priceless object to-day I am giving them away simply giving them away as an advertisement for the ridiculous sum of ten cents or a dime to-morrow I may be selling them again thank you sir it magnifies as well as any three dollar microscope and you are getting it for the paltry sum of ten cents it is recommended by all the most celebrated lawyers doctors ministers and scientific men as the most wonderful invention of the age and the gentleman here takes one why it is worth one dollar alone to examine a drop of water before you drink it and you will plainly see the seven kinds of insects in each drop ants grasshoppers crickets bees flies beetles and centipedes look at them and then drink your water and the gentleman here takes one thank you and you'll thank me before the day is over and the little boy takes one ten cents or a dime its worth more than that to see the skin on your hand thank you sir," etc.

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The Italian Cruiser Piemonte.

At the recent meeting of the Institution of Naval Architects, a paper was read by Mr. P. Watts, on the Piemonte, which has recently been built at Elswick for the Italian government, a vessel of 2,500 tons displacement, 300 ft. long, 38 ft. broad, and 15 ft. mean draught. She has a protective deck, 1 in. thick in the middle, and increasing to 3 in. on the slopes. Her armament consists of six of the new Elswick 6 in. quick firing guns, four of which are sponsoned out, so that two can fire ahead and two astern. There are besides six 4¾ in. guns of the same pattern, ten 6-pounder Hotchkiss guns, four of which can fire ahead and four aft; six 1-pounder Hotchkiss guns, of which there are two in each of the two lower tops; two 10 mm. Maxims in each of the two upper tops; and three torpedo tubes, two on each broadside and one straight ahead. The penetrative power of the guns is considerable. Thus the 4¾ in. guns, weighing only 2 tons 1 cwt., can pierce 10½ in. of wrought iron; and the 6 in. gun, weighing 5¾ tons, can pierce 15 in., both taken at muzzle velocity. The 4¾ in. gun fired ten rounds in 47½ seconds, as against 5 minutes 7 seconds for an ordinary breech-loader of that size. Lord Armstrong has recently pointed out that the Piemonte can discharge against an adversary in a given time twice the weight of shot and shell that can be fired by the largest war vessel afloat. The engines and boilers are wholly below the water line, and the armor deck above is supplemented by packing of patent fuel or coal. The ship is divided throughout into many watertight compartments, and has a double bottom. There are coal bunkers along the side throughout the machinery compartment, and dwarf bulkheads divide the bunkers into spaces of 10 ft. to 12 ft. long. Below the armor deck, before and abaft of the machinery, is a flat that could be packed with patent fuel or stores, so as to form a raft body. Patent fuel is recommended for the lower bunkers, as it practically excludes the water, however the sides may be riddled, and is less liable to be blown out. The thickness of the vertical armor, with its backing, that might have been attained instead of the sloping deck, is 10½ in., whereas the sloping deck and its fuel covering are equal to 6 in.; and this, divided by the size of the slope, gives 14 in. as the horizontal thickness, or 3½ in. more than a vertical belt would have. A sloping armor is also more efficient in resisting projectiles, and as the shells would burst in the fuel, the armor would only have to resist the broken pieces. Sloping armor is also cheaper, and enables 100 tons more coal to be carried, though it has the disadvantage that the fuel might be blown out, and the ship's structure damaged by shells that would not penetrate the vertical armor. The engines, constructed by Messrs. Humphrys, Tennant & Co., are two sets of vertical triple expansion engines, giving a speed of 19½ knots without using the fans, 20·168 knots with an I. H. P. of 7,760 at ¼ in. pressure, and 20·3 knots with 8,000 I. H. P. at ½ in. pressure, while with closed stoke holds and forced draught, giving 11,600 H. P., the speed was over 21 knots. The turning trials have not yet been made. The full coal supply is 600 tons, enabling the ship to cruise at 10 knots for fifty-five days, during which she could cover 13,200 knots. The vibration at the highest speed was never more than 0·12 in., as measured by Mr. A. Mallock's seismometer.

Water Gas.

Even at 1,000° the decomposition of watery vapor by carbon is incomplete. Before water gas can be commonly used for heating or lighting, like coal gas, a method must be found of communicating to this gas, which is in itself inodorous, a scent much more penetrating and persistent than that of coal gas, since, by reason of the large proportion of carbon monoxide which it contains, it is at least five times more poisonous than coal gas. The deadly character of a gaseous mixture seems to increase much more rapidly than the proportion of carbon monoxide. According to the researches of Dr. Wyss, the dangerous results of the inspiration either of coal gas or water gas are due solely to carbon monoxide. During the months of January and February, 1888, seven cases of poisoning from water gas have occurred in New York. It is proposed that water gas might be rendered odorous, so that its escape could be at once detected, by means of mercaptan.—*J. Lange and J. Lunge, in Zeitschrift fur Angewandte Chemie.*

Castor Oil.

The authors infer from their experiments that the liquid acid of castor oil is not a single compound, as it has been hitherto supposed, but a mixture of two isomeric acids of the composition $C_{18}H_{34}O_3$, one of which, ricinoleic acid, yields on oxidation trioxystearic acid, while the other, ricinisoleic acid, yields isotrioxystearic acid. The proportion of these acids is about one of the former to two of the latter. As no dioxystearic acid has been obtained from the oxidation of the liquid acids of castor oil, it may be concluded that of all the fatty oils hitherto examined, castor oil is the only one which contains no oleine.—*K. Hazura and A. Grussner, in Zeitschrift fur Angewandte Chemie.*

The Monitor Puritan.

The new double-turreted war vessel Puritan recently arrived at the Navy Yard, Brooklyn, N. Y., from Norfolk, Va. The ship is to be completed at Brooklyn.

The Puritan is a low freeboard, twin screw monitor. She is built of iron throughout, and will be armored with steel 12 inches thick, extending the entire length of the vessel. She will carry four 10-inch breech-loading rifles in two turrets and an efficient secondary battery. The steel armor of the turrets will be 11¾ inches thick. The guns will have a range of over eleven miles.

The principal statistics of the vessel are: Length between perpendiculars, 280 feet; length on load line, 291 feet; length over all, 295 feet 8½ inches; extreme breadth, 60 feet 1½ inches; draught, 18 feet 2½ inches; displacement to load water line, 6,060 tons; indicated horse power, 3,600; speed, 13 knots.

The motive power is furnished by two direct-acting, horizontal compound engines placed in watertight compartments. The cylinders are 50 and 86 inches in diameter by 42 inches stroke. There are ten return fire-tube boilers, with a grate surface of 700 square feet. The working pressure is 80 pounds. The two screws are of the Hirsch pattern, and are made of cast iron. They are four-bladed, 15 feet in diameter, and 23 feet mean pitch.

The Puritan will be a really formidable vessel. Carrying in her turrets four 10-inch breech-loading rifles, elevated, trained, and loaded by machinery, protected by 11¾ inches of steel armor, and firing a projectile weighing 500 pounds, capable of piercing 23 inches of wrought iron at the muzzle or 17½ inches at the distance of a mile, the Puritan need fear but few vessels afloat. In addition to the heavy guns, she will carry a secondary battery, consisting of two six-pounder and two three-pounder rapid-fire Hotchkiss rifles, two thirty-seven millimeter revolving cannon, and two Gatlings. She will have a torpedo net of heavy steel rings, which can be rigged out all around the vessel, and so protecting her from torpedo attacks. There will be a powerful search light for use at night.

The Puritan compares more than favorably with the Conqueror, one of England's modern turret vessels, and with the Tonnerre of the French navy.

The Measurement of the Candle Power of Electric Street Lights.*

In measuring the candle power of electric street lights while burning in their position on the street, one has certain difficulties to contend with which are absent in ordinary photometric measurements. The chief of these difficulties lies in the facts that the lamp to be tested is at a considerable height above the horizontal plane which the photometer can, in most cases, conveniently occupy, and that the work must be done out of doors. In compliance with the request of the editor of the *Journal*, I will briefly describe the way in which I have sought to solve the problem which presents itself.

In the first place, the photometer must be modified, so that the light coming from a point considerably above its plane shall yield a beam parallel to the bar. This may be done in two ways:

First.—By having the photometer bar horizontal, as usual, and placing at one end of it a reflector, which shall throw the beam from the electric light along the bar. This reflector must, of course, be a plane surface, and may be an ordinary mirror or a totally reflecting prism.

Second.—By inclining the bar in the vertical plane so that it shall point directly at the lamp. Of these two methods I prefer the latter, because the use of a reflector of any sort involves loss of some light, the amount of which must be carefully determined and introduced as a correction in the final calculation, while it offers no advantage over the direct method to compensate for the greater trouble and liability of error in the results.

In the second place, a direct measurement of the distance from the arc to the Bunsen screen is, in general, not easy, and the modified photometer should provide some way for its indirect, and, at the same time, accurate determination.

Thirdly, the photometric work must be done in the open air, and in a number of more or less widely separated places on the same evening. The photometer must, consequently, be readily portable, and at the same time must be provided with a special lantern to protect the standard light from draughts, and with screens to cut off all extraneous light.

To meet these points I have constructed my photometer as follows: The graduated bar is fastened by a pin passing through one end to the edge of a thick board which serves as the base of the instrument. On this pin it moves freely in a vertical plane. At a convenient distance from the pivoted end a graduated circular arc, of some 50°, is attached to it in such a position that when the bar is raised, the arc plays in a slot in the edge of the base board. By means of a thumb-screw the arc can be clamped to the base at any point, and thus serve both as a support for the bar at any angle above the base and as a means for determining this angle by the reading of the graduation. The base has fastened to it a carefully adjusted level. The lantern containing the standard light is mounted on the base just beyond the pivoted end of the bar. When a measurement is to be made, the photometer is first brought into the same vertical plane with the electric lamp, and the base accurately leveled. The bar is then raised until it points directly at the lamp, and clamped in this position. The carrier, with its Bunsen screen, is then mounted on the bar together with blackened diaphragms, which serve to cut off all light except that coming from the standard and the lamp to be tested. If the night is a dark one, and other lights not too near, no further precautions in the way of screens are necessary; otherwise, the photometer is mounted in a covered wagon.

After the readings have been made [giving the distances of the Bunsen screen from the zero mark at the pivoted end of the bar], the horizontal distance from the zero mark to a point vertically beneath the electric light is measured, and the angular elevation of the photometer bar is read on the graduated arc. From these data the direct distances from the screen to the electric light are readily calculated. The corresponding distances from the screen to the standard are obtained afterward by placing the bar at the angle noted and measuring directly from the screen [at its reading] to the point which the standard occupied in the out-door work.

* By Prof. J. T. Stoddard, Smith College, Northampton, Mass., in the *American Gas Light Journal.*

The New Trade of Electrical Plumber.

The extensive adoption of lead-coated cables for subway electrical lines has given birth to an occupation which is in some sense a new trade—the electrical plumber. The subway cables have to be joined at frequent intervals, at the least at every second manhole. In uniting the ends, the skill of both electric lineman and plumber is required. A cable may contain a hundred or more wires, which may be grouped in pairs to add to the complexity. To join such a cable the wires have to be properly connected with each other, each splice has to be carefully insulated with tape or equivalent wrapping, and finally a sleeve is slipped over the joint and secured by two wiped joints. At this point the lineman has to change his trade and become a plumber, when he "wipes" the joints at each end of the sleeve, so as to protect the wires perfectly from moisture. Much other work falls within his scope. Lateral connections have to be made. One or more wires have to be picked out and led to one side or the other on new routes. As the system grows in extent, so will his work increase in complexity. In fact, what is to some extent a new trade has been created. It is said that there are now about one hundred skilled electrical plumbers in this country, and that the best men are well known and are in constant demand.

The World Full of Death Traps.

According to the *American Analyst*, the worst enemies of the human race are the doctors, who try to prolong our miserable existence in a world full of death traps. One medico tells you not to eat or drink what you relish because you will eat or drink too much. Another says that you must only eat what you fancy, because otherwise you will bolt your food without giving to each morsel the thirty-six mastications which are necessary for digestion. You must wear a respirator over your mouth, a pad on your chest, and a swarth of flannel round your loins. If you live in town, you will die of fog; if you go to the country, you will be poisoned by bad drainage; if you drink water, you are tempting the typhoid fiend; milk spells scarlatina, and tea cake is sudden death. Do you shun these tempestuous pleasures of the senses and take refuge in the recreations of the mind? Do you borrow a novel from the circulating library? That is to import the germs of disease into a healthy household. The volume in your hands may have been perused by a person recovering from an infectious illness!

Dixon's Silica Graphite Roof Paint.

To give satisfaction, a paint should be a protection against the changes of temperature, the wear and tear of storms. It should be easily laid on, durable, and economical. Graphite and silica stand equally well extreme cold and changes of temperature; they are not touched by rust, and both resist the influence of a salt atmosphere. Graphite is very light. One pound of it is three times the bulk of white lead and twice that of mineral paints. The natural color is slate, but it can be furnished in all shades, from slate to a jet black, suitable either for regular surface painting, metal or shingle roofs, or any exposed metal or wood surface needing a durable paint. All the ingredients are harmless. Painters will not be affected by its use, and it is said cistern water gathered from roofs painted with it is not contaminated. This paint is prepared ready for use in several different styles by the Joseph Dixon Crucible Co., Jersey City, N. J., who will be glad to furnish any additional information desired.

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ALASKA AND ITS RESOURCES.

(*Continued from first page.*)

ing illustration to be an alligator, but it is a howling wolf singing his requiem over the charred remains of some departed chieftain. Its companion lying on the ground by its side is a wooden whale, whose sepulcher has collapsed under it. These figures are the totems of the families whose bones repose in the houses beneath. Cremation has been generally abandoned since the arrival of the missionaries. Totems of a different type are represented in another view. These poles are very tall, and are elaborately carved with stone hatchets, and are considered great works of art by the natives. The carvings are emblematic of important events in the history of the chief in whose honor the totem has been raised. Each family or subdivision of a tribe has its own totem, and these monuments serve to distinguish between families much as armorial bearings did in the middle ages. Each child belongs to the tribe and family of its mother, as the father is not considered in the light of a relation.

Gold is found in some quantity, and we give an interior view of the Treadwell stamp mill, which is quite extensive. The concentrators and stamps are shown in the cut. The free gold is caught in the trays with quicksilver. The machinery is run by water power. Fishing, however, is a more important industry and one which is being very rapidly developed. Nineteen salmon canneries are now in operation in Alaska, and very few realize how the waters of Alaska abound in salmon. They are much more numerous than they are in the prolific waters of California, Oregon, and Washington Territory. Thousands have been taken, so we are informed in a recent government report, by a single haul of the seine. We quote the following from this report:

"On the southeast shores of the Alaskan peninsula, in the bays with small streams entering into them, the salmon are crowded so thickly that the progress of the boat is impeded by them, and should a southeast storm suddenly arise at such seasons, the fish are driven on the beach in innumerable quantities. One of the Russian navigators assured us (1867) that under such circumstances he has seen the beach strewn two or three feet deep with stranded salmon. Vancouver has recorded that he saw them in Burrough's Inlet cast up on the beach in great numbers." This all sounds indeed like a fish story, but we must not look upon it askance, as it appears in government records, advance sheets of which have been received by us from the San Francisco Bureau of the United States Coast and Geodetic Survey.

The salmon fisheries have increased very rapidly. In 1887 eighteen vessels were engaged in the traffic and 190,000 cases of salmon were exported. In 1888 the number of vessels had increased to twenty-eight and between 300,000 and 350,000 cases were exported.

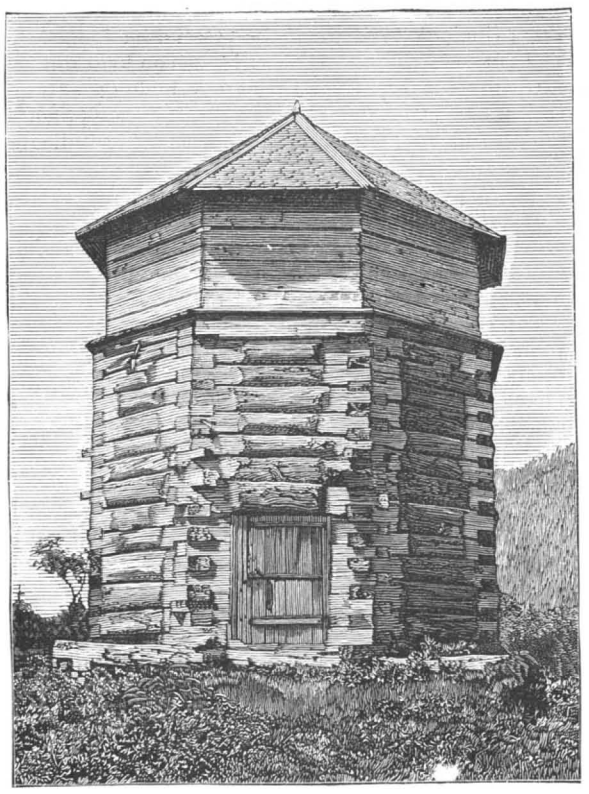
Whaling is also extensively carried on in Alaska, and in 1887 forty vessels were engaged in this business, six of which were steamers. The total catch yielded 33,268 barrels of oil and 642,200 pounds of whalebone. As was mentioned in a previous article on Alaska,* one of the greatest resources of this vast region is its forests, which are practically virgin. The value of these is not appreciated so much now as it will be later, when the wood supply of the Pacific States, which is being so wantonly wasted now, has begun to give out. Then Alaska with its great supply of hemlock, spruce, and cedar trees, will be sought to supply the devouring hunger of advancing civilization. Our views were prepared from photographs furnished us by Mr. George W. Weister, who has recently returned from an extended tour through Alaska.

* See SCIENTIFIC AMERICAN, April 13, 1889.

The Life History of a Marine Food Fish.

A lecture was delivered recently at the Royal Institution, by Professor W. C. McIntosh, on the life history of the principal edible sea fishes. It is only within the last few years that the subject has been properly understood, very erroneous ideas respecting it having prevailed up to a recent date. For instance, it was thought that sea fishes sought shallow water in the spawning season in order to deposit their eggs on the bottom, but there is no reason whatever to lead to the supposition, the probability being that the eggs are ejected wherever the fish happens to be. The life history and development of fresh water fishes, such as the salmon, have been pretty accurately known for some time, owing to the greater facilities for observing them, but the observation of marine fishes has presented greater difficulties, necessitating the employment of more expensive methods.

The lecturer explained and illustrated the methods employed and apparatus used for capturing the eggs and young fish. Nets with very fine mesh are employed, and are chiefly of three kinds, one for use near the surface, another for sinking to a considerable depth, and a third for attaching to the beam of a



RUSSIAN BLOCK HOUSE.

trawl to catch those at the bottom. Unlike those of the fresh water fish, the eggs of the majority of marine fishes are not deposited on the bottom, but float freely about in the ocean wherever the currents carry them, and are therefore called "pelagic." The cat fish forms an exception, its eggs being deposited in masses at the bottom. The "pelagic" eggs are small, transparent, glassy spheres, which can scarcely be seen when floating in the water; their specific gravity is almost the same as that of sea water, so that they float about at various depths beneath the surface and are carried up or down by the slightest current. Many of them have a globule of oil in them which has been supposed to have something to do with their floating, but this is probably not the case. The number produced by a single fish is enormous, being about nine millions in the case of the cod. Their vitality is very great and withstands a considerable amount of heat, eggs which had been heated to a considerable temperature in a test tube having afterward unexpectedly shown signs of life and motion: they are more readily killed by cold.

The egg gradually develops into the embryo fish, which at first has no mouth, but lives on nutriment derived from the yolk sac of the egg, which remains as a large lump on the under surface of the anterior part. In the embryos of most mammals and fresh water fish the nutriment is absorbed from the yolk sac by blood vessels sent down into it; but in the cod and other marine fishes, although the heart is present and beating in the embryo, no blood vessels are sent down into the yolk sac, and the nutriment is probably absorbed directly by the tissues. After about ten days the mouth opens and the yolk sac gradually disappears. At first the embryo is transparent and passive, allowing itself to be carried about like the egg, but it soon begins to develop patches of pigment and fins, although these are very different from those found in the mature fish.

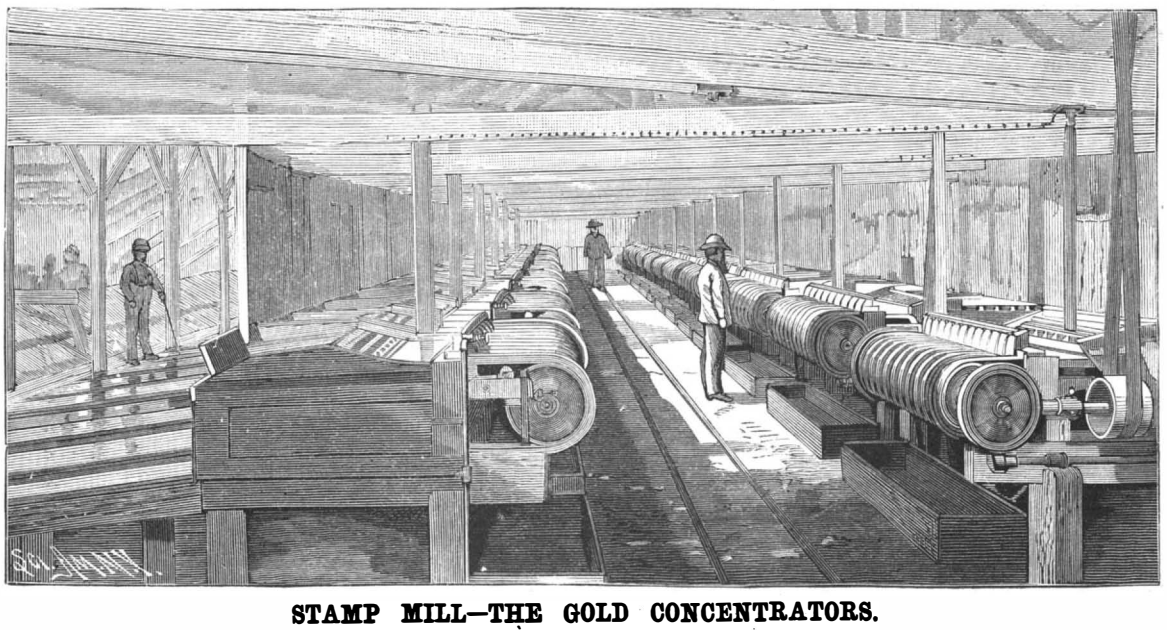
The color and form of most sea fishes vary very much at different stages of growth, and in many cases they could not be recognized as the same fish; the young ling for instance, besides being very different in color from the adult, has two very long pectoral fins, which caused it at first to be taken for a new kind of fork-beard. These differences in the young and adult stages are probably to be attributed, as in mammals, to the survival in the young of ancestral peculiarities, which have become modified in the adult to suit different circumstances. These differences are very remarkable in the flat fishes, such as turbot, flounder, etc., where the young fish is nearly round and has the eyes symmetrically placed on each side of the head; at this stage it does not lie on the bottom, but swims freely in the upper water. As it gets older the fish seeks the bottom and exhibits a tendency to lie constantly on one side, and one eye works round from the lower side to join the other on the upper. The eye may pass round over the top of the head, or in some cases it may pass through the soft tissues; in the young stage the body is so transparent that the fish can probably look obliquely through its own body and see what is passing on the other side. At the same time that the eye passes round, the under side loses its color and becomes white, the upper side remaining pigmented. It sometimes happens, however, that from some unknown cause a young flat fish does not go to the bottom but remains swimming in the upper waters, and then both sides remain colored and symmetrical.

The food of the young post-larval fish consists of minute crustaceans, etc., which are present in large quantity in the ocean, and nearer land, at the mouths of estuaries, etc., the spawn of mussels and similar mollusks which feed on microscopic plants affords a plentiful supply. At a later stage they are very voracious, and many specimens were shown of fishes which had attempted to swallow others nearly as big as, or even bigger than, themselves, with fatal results. The general tendency among marine fish is to sink down toward the bottom as they get older, the younger ones keeping nearer the surface; near land, the younger ones seem to find their way toward the shore, but migrate outward again as they get older.

The lecturer touched on the point of providing a close time for sea fishes during the spawning season, and thought that although it might easily be done in the case of any special fish, it was scarcely feasible to make it general, as the spawning period varied so much among different species as to stretch it over a great part of the year for the whole. He did not think that the ravages of man made a very great impression on the numbers of fish, but urged the importance and utility of studying their lives and habits. A good deal had been done in the last few years, and he hoped that the government, which had been so generous in sending out the Challenger expedition, would also help in this direction.

Lost Arts.

Wendell Phillips, in his lecture on the "Lost Arts," in speaking of malleable glass, tells of a Roman who, in the age of Tiberius, had been banished, and returned to Rome, bringing a wonderful cup. This cup he dashed upon the marble pavement, and it was crushed but not broken by the fall. Although somewhat dented, with a hammer he easily bent it into shape again. It was brilliant, transparent, but not brittle. He further states that the Romans obtained their chemistry from the Arabians, and that they brought it into Spain eight centuries ago. In the books of that age there is a kind of glass spoken of that, if supported by one end, by its own weight in a day's time would dwindle down to a fine line, so that it could be curved around one's wrist like a bracelet.



STAMP MILL—THE GOLD CONCENTRATORS.

The art of luminous painting was known to the Japanese nine hundred years ago, and an extract from one of their old writers has been translated as follows: "One Su Ngoh, many years ago, had a picture of an ox. Every day the ox left the picture frame to graze and returned to sleep within it at night. This picture came into the possession of the Emperor Tai Tsung, of the Sung dynasty (A. D. 976–998), who showed it to his courtiers, and asked them for an explanation, which none of them, however, could give. At last a certain Buddhist priest said that the Japanese

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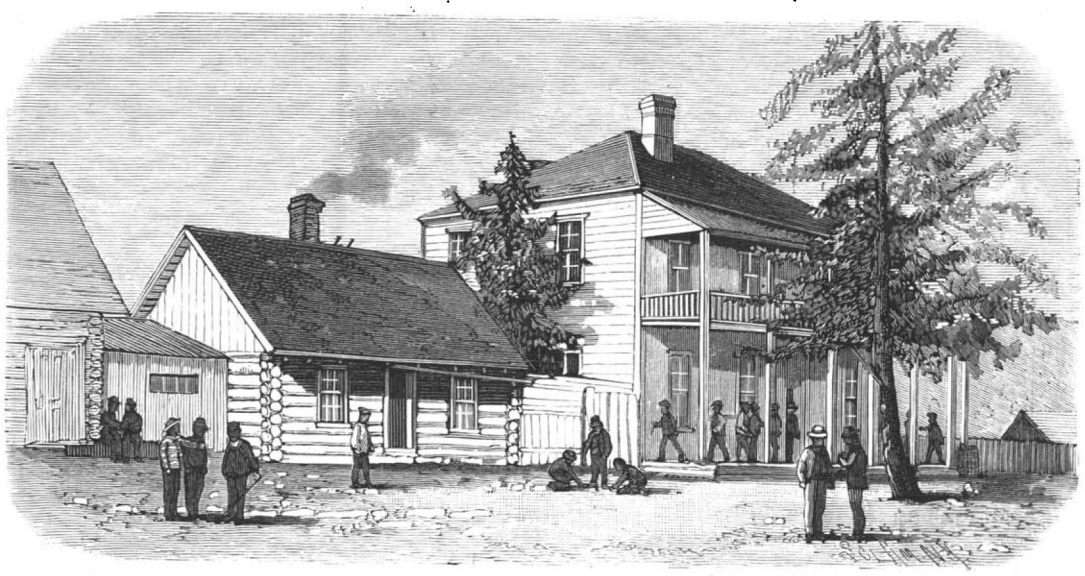
found some nacreous substance within the flesh of a certain kind of oyster they picked up when the rocks were bared at low tide, and that they ground this into color material and then painted pictures with it which were invisible by day and luminous by night." The secret simply was that during the day the figure of the ox was not visible, and it was therefore said that it left the frame to go grazing.

Many instances of remarkable mechanical ingenuity are related by various ancient authors. In the year



INDIAN TRAINING SCHOOL AT SITKA.

1578, the twentieth of Queen Elizabeth's reign, one Mark Scaliot, a blacksmith, made a lock consisting of eleven pieces of iron, steel, and brass, with a hollow key to it that altogether weighed but one grain of gold. He also made a gold chain, composed of forty-three links, which he fastened to the lock and key. In the presence of the Queen he put the chain about the neck of a flea, which drew it with ease, after which he put the lock and key, flea and chain, into a pair of scales, and they together weighed but one grain and a half. This almost incredible story is vouched for by an old writer.

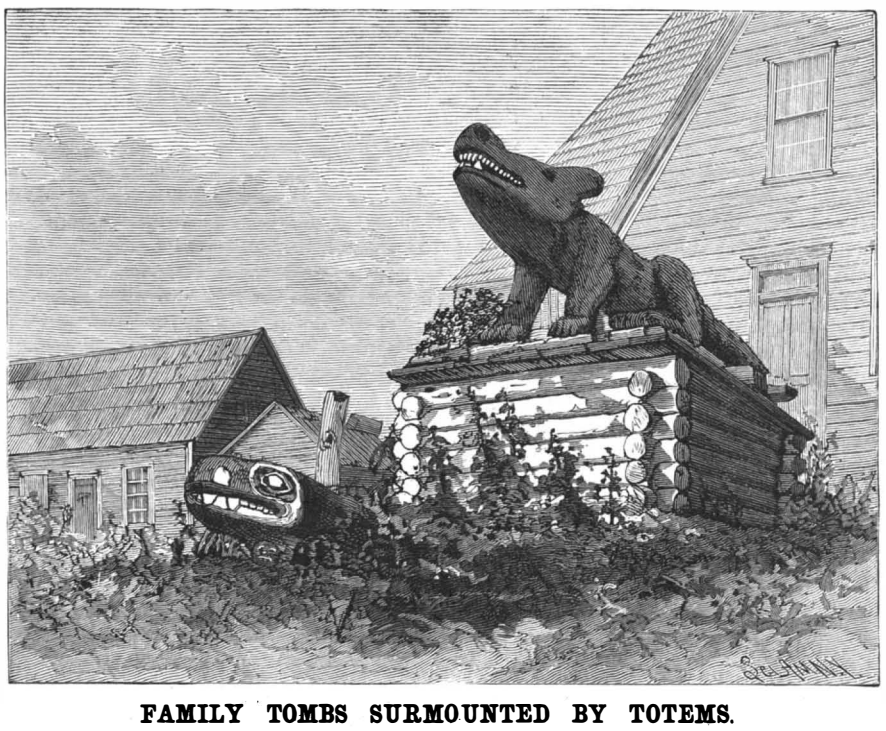
Myrmecides, an ancient carver, was also so proficient in microscopic mechanism that he made an ivory chariot with four wheels, and as many harnessed horses, in so small a compass that a fly might have hidden them all under its wings. The same artisan made a ship with all her decks, masts, yards, rigging, and sails, which took up scarcely more room than the chariot.

The silver sphere, "a most noble and ingenious performance," which was presented to Sultan Solyman the Magnificent by his Imperial Majesty Ferdinand, is mentioned by Paulus Jovius as showing and keeping time with the motions of the celestial bodies in their various configurations. It was carried to Constantinople by twelve men, and there put together by the artist that made it.

An artificer named Cornelius van Drebble once made an instrument like an organ that, being set in the open air, under a warm sun, would play airs of itself without the keys being touched, but would not play in the shade. For this reason it is supposed that it was inclosed air, rarefied by the sun, that caused the harmony. George Whitehead an Englishman, made a ship, with all things pertaining to it, to move as if it sailed upon a table. "All hands were aloft, a woman made good music on a lute, and a little puppy cried in the midship, all of which variety," quaintly says an old author, "was very pleasant and diverting."

Proclus, whose fame in mathematics equaled that of Archimedes, is said to have made burning glasses in the reign of Anastasius Dicorus, of such wonderful efficacy that at a great distance he burnt and destroyed the Mysian and Thracian fleet of ships that had blockaded Byzantium. The Damascus blades, as marvels of perfect steel, have long been famous, and even those used in the crusades are as perfect to-day as they were eight centuries ago. One on exhibition in London could be put into a scabbard almost as crooked as a corkscrew, and bent every way without breaking. The point of this sword could be made to touch the hilt.

The poets have celebrated the perfection of the Oriental steel, and many famous writers have sung its praises. Scott, in his "Talisman," describes a meeting between Richard Cœur de Lion and Saladin. Saladin asks Richard to show him the wonderful strength for which he is noted, and the Norman monarch responds by severing a bar of iron which lies on the floor of the tent. Saladin says, "I cannot do that," but he takes an eider down pillow from a couch, and drawing his keen blade across it, it falls in two pieces. At this feat Richard says: "This is the black art—it is magic; you cannot cut that which has no resistance." Saladin, to show him that such is not the case, takes his scarf from his shoulders, which is so light that it almost floats in the air, and, tossing it up, severs it before it can descend. That Scott's story is not an exaggeration is proved by a traveler who once saw a man in Calcutta throw a handful of floss silk into the air and a Hindoo sever it into pieces with his saber.—*Pittsburg Dispatch.*



FAMILY TOMBS SURMOUNTED BY TOTEMS.

Risks Encountered on the Streets in Cities.

The *Albany Law Journal*, usually devoted to stern legal lore, thus facetiously enumerates some of the dangers incident to metropolitan life:

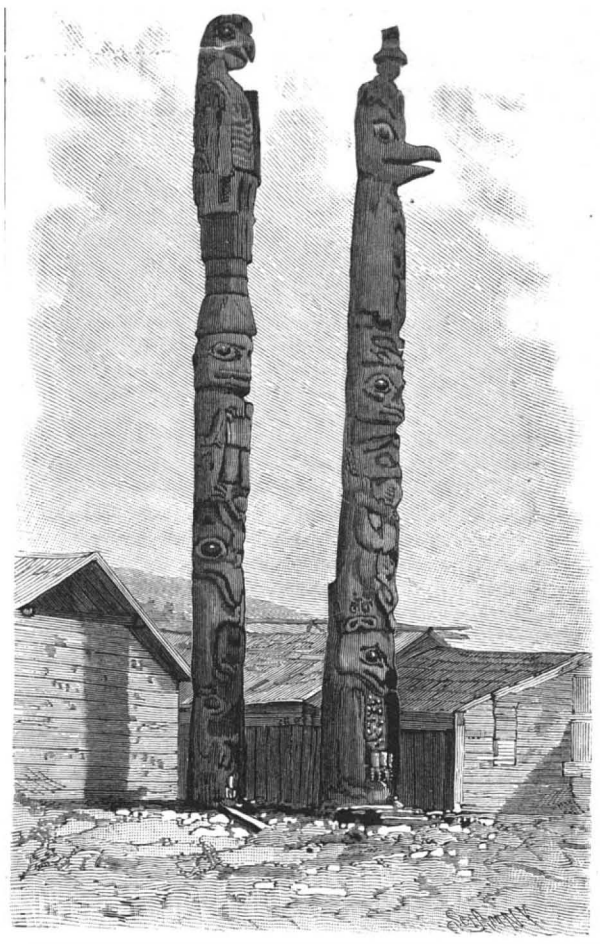
"Instead of snow balling there is the base ball nuisance, maintained by small boys, without pay, in imitation of men who play ball for salaries larger than those allotted to most of the judges. Instead of coasting or 'bobbing,' there is the swift and stealthy bicycle, as deadly as the ancient war chariot, running people down, or at least causing the nervous man to jump to one side like a tarantula. Then a school of sweet little girls on roller skates swoops down upon us, making it dangerous to turn either way, and compelling us to stand still and see our salvation. Our neighbor's coal hole is open or insecurely covered, and one leg slips in or both heels fly out, with woe to brittle bones. There is the peel of orange or banana dropped upon the flagging in disregard or defiance of our statute in that case made and provided.

"There is the danger of the whip-lash, flourished by the profane driver of an over-freighted wagon, or stuck out at conventional right angles over the sidewalk by the liveried lackey upon the carriage box, threatening loss of eyesight or a mark on the cheek like a saber slash in a German student's duel. We bruise our legs in climbing over skids stretched across the walk, or we barely dodge a box or barrel, or one of those pasteboard safes spoken of by the funny man of the *Times*, falling from a hoistway. A rickety sign endangers our head or a low wire our thought.

"We stop to chat with a friend, and lean against a deadly charged electric pole and it is all over with the conversation. A passing plumber burns our coat with his unextinguished hand furnace. A passing carpenter lacerates our trousers with a saw; a passing porter imperils our head with a long piece of gas pipe on his shoulder.

"One is annoyed if not endangered by the servant washing the sidewalk by a hose, or a fireman carrying his wriggling serpent up a ladder. A fresh young Italian maid from Cork, with a white muslin nightcap on her head, runs us down with a baby carriage, scarring our shins or necessitating a visit to the chiropodist.

"Then there is the woman's umbrella that wasteth at noonday, scooping us up after the manner of a drag net, or impaling us in its blind and headlong charge. All these are sidewalk perils. If we undertake to cross the street, dangers multiply. The pedestrian has no rights which the driver is bound to respect, and the footfarer, unless a handsome woman personally conducted by a big policeman, will be subject to being run down by the driver of a beer wagon, or a physician in a hurry, or the chief of the fire department on his 'golomping' way to a conflagration, or a coroner intent on beating a rival, or a belated voter standing out till



TOTEMS ERECTED IN HONOR OF DEPARTED CHIEFS.

the last moment for his price, or even a hearse on its business way back from the grave.

"Runaway horses are another source of midway perils, and so are wagons turning around corners with long irons or beams projecting from behind. This list might, perhaps, be increased, but these common instances show that man walks the city amid perils scarcely less than those of the desert, the sea, the forest, or even the battlefield; almost as deadly as those encountered and enumerated by St. Paul.

"Most of them, indeed, are 'perils by false brethren,' against which the injunctions and penalties of the law are futile. To avoid misapprehension, we will add that these lines are not written in the interest of any particular accident insurance company."

A Remarkable Fistula.

In the *Deutsche Monatschrift fur Zahnheilkunde* for December, 1888, Dr. Nicolai, of Stuttgart, gives the history of a case in which a fistula opening at the nipple was found to be connected with a diseased molar tooth. According to a summary in the *Centralblatt fur Chirurgie*, the connection was first inferred from the fact that the discharge from the opening just above the left nipple ceased at once after proper treatment of the diseased left lower first molar, and it was afterward proved by an injection of cochineal into the alveolus of the tooth, which caused a red coloration of the pus discharged at the nipple. Further examination showed that the pus had made its way through the maxilla, descended along the border of the sterno-cleido-mastoid muscle, perforated the fascia of the platysma myoides, and coursed over the pectoral muscle into the substance of the mammary gland. The fistula closed in twelve days after the removal of the diseased tooth.—*N. Y. Medical Journal.*

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The Patent Office the Friend of the Inventor.

In the recent case of Donovan, on appeal, the Hon. Benson J. Hall, Commissioner of Patents, laid down the following excellent doctrine, which it is hoped the examiners will keep in mind:

"The rules of the office, particularly rules 68 and 139, point out that at all times in the investigation of an application, and in the progress of appeals, it is the duty of each tribunal having jurisdiction of the case to see to it that the inventor shall secure a patent for whatever patentable matter may be shown in his application. As has been frequently stated by me in decisions, the office must put itself in the attitude of a friend, and not of a litigant with the applicant, and see that he secures every right that belongs to him. Not only is this true of the rules cited, but Congress has seen proper to take especial pains to provide that whenever an applicant, in consequence of any inadvertence or mistake in the framing of his specification or claim, has failed to secure that to which he is entitled, or his patent is inoperative or invalid either by reason of having claimed too much or too little, he may have the proper correction made by a reissue, which will secure him the precise invention to which he is entitled.

"Now, unquestionably, if under rules 68 and 139 it is the duty of examiners-in-chief and the Commissioner to suggest and recommend, in order that an applicant may receive letters patent for subject matter not involved in the appeal, it must be the duty of the primary examiner in the examination of the case made by him to point out and recommend the same thing. I do not mean by this that it is the duty of the examiner to become an agent or an attorney for the applicant; but I think in all cases when he is satisfied or believes that the application contains patentable matter which is not claimed, but which he has reason to believe the applicant is seeking to cover, it is his duty to advise the applicant briefly and specifically, precisely as the examiners-in-chief and the Commissioner are authorized to do, as above stated. By acting upon this principle, all of the tribunals of the office become friendly to the applicant, and enable him to clearly see and understand the views of the office as to the nature and patentability of the invention described. Such practice would undoubtedly tend to lessen the correspondence and conflicts which arise between applicants or their counsel and the office."

The Soda Fountain.

BY JAMES VERNOR.

The main points upon which the success of a soda water business depends are few in number, but although apparently trifling, they are in reality of the most vital importance.

First, we must be able to offer the public a beverage that the great majority will really like. It must not only be palatable, but satisfying, and the more satisfying it is, the better the result will be on the business. No matter how pleasant or palatable a beverage may be, if the public decide that it is "thin" or that it has "nothing to it," its sales will be limited. The day of "sweetened wind" has gone by, and the failure of many a fountain to pay may be accounted for by the fact that nothing but that article was ever drawn from it. There are dozens of good beverages offered by manufacturers in the form of "extracts," any one of which will yield handsome profits, and the man who is unwilling to purchase those extracts because the manufacturer makes a profit on them, and because he imagines that he can make something similar which will do just as well, while costing but a trifle, might in ninety-nine cases out of a hundred just as well give up the soda water business, for he will rarely make a success of it. I grant that an occasional success may be attained, but the risk is a very great one, and at the best it will require years to arrive at the point where, had the other plan been pursued, a single season would have found him.

No matter how many special drinks are drawn, every fountain should, as a basis, draw soda water, and it should be something more than "sweetened wind." The water should be perfectly filtered and thoroughly charged with carefully washed carbonic acid gas, until, after plenty of agitation, the gauge indicates 100 pounds pressure. The sirup should be heavy with pure cane sugar (12 pounds to the gallon of water). Fruit sirups should be made from pure fruit juices, which, if you are too indolent to make for your own use, you can always buy, although not quite as good nor quite as economical. The vanilla should not be tainted with tonka bean, nor the ginger with capsicum, the coffee should be a very strong decoction of the most fragrant berry, in each gallon of which should be dissolved while still hot 12 pounds of granulated sugar. The chocolate should be made from the very best cocoa, and should be free from fat and rich in sugar. All sirups should be dispensed in connection with good, plain, pure, rich cream, whether called for or not, and ice cream should be relegated to the "ice cream parlors," where it more properly belongs, and where it will not spoil a good glass of soda nor the genial disposition of the gentleman who is endeavoring to place before the public something better than "slops" and "sweetened wind." Cases will occur where customers cannot take cream in any form. Experience has shown that with such customers a little dash of vanilla sirup, added to any order they may give, usually elicits a remark complimentary to the beverage drawn from that fountain, showing the wisdom of the French makers of chocolate, who realize the importance of the vanilla bean as a valuable adjunct to their products.

The next point is the temperature at which the drink is to be dispensed. Experience has shown that the public desire an extremely cold drink, and the dispenser should see to it that they have what they want. It is poor economy to save on ice or block tin pipe. Buy all required of both to have every glass of the beverage that crosses the counter uniformly cold. A thermometer plunged into a glass of it during your busiest moments, that will not fall to 45°, should be accepted as evidence that more cooling facilities are necessary, and the same should be procured with the least possible delay. The necessity for uniformity in temperature, as well as taste, of any beverage cannot well be overestimated. Attendants should be trained to use an exact amount of sirup and cream, coarse stream, and fine stream, each and every time that they wait upon a customer. A standard should be established, and every attendant should be expected to live up to it, the object being to thoroughly impress upon the mind of the customers that when they come to that fountain they will get just what they call for, and can be certain that it will taste just as they expect and desire it to. The result will be that, other things being equal between two stores, the one in which the customer knows such a state of things to exist will get the benefit of his patronage every time. Next in order is the glasses. They should be just as fine in quality as possible, and always scrupulously clean. The use of thin glassware necessitates a considerable expense, not alone in breakage, but also in the help necessary to keep them clean, but in my opinion it is much more than counterbalanced by the increased business induced by their use. It is a popular belief that all beverages taste better when drank from thin containers. How long would champagne retain its popularity if served in thick coffee cups? or the popularity of the after-dinner coffee, were it not for the dainty china used? The wise man takes advantage of these little things that have such a hold upon the public and turns them to his own benefit. Another nice point is the cleanliness of the glasses. It is not sufficient that a glass after use be swashed around in a pail of water and then turned upside down upon a drainer until it is to be used again. The very sight of a dozen or two glasses in the various stages of the drying process, from the one dripping with moisture and clouded with cream to the one dried till it looks as if it were afflicted with leprosy, is enough to turn the stomach of a strong man, to say nothing of the ladies. There is but one way to wash a glass and have it clean, and the sooner that every soda water dealer realizes that fact, the better will it be for him and for all concerned. Take the matter to yourselves and your own homes; your wife or child uses a glass and places it upon the sideboard, and yet, although you know that none but them could have used it, should you desire a drink you will take a fresh glass, and notwithstanding that fact, the public at a soda fountain are expected to use a glass after every one, although the last lips that pressed its edges may have been smeared with tobacco juice or festering with disease, and what excuse have you to offer for it? Custom, custom and nothing else, but it is a custom that has done more to drive people away from a healthful and pleasant beverage than any other one thing. Let us have a grand reform in this particular, and let us in the future give no one cause that likes them to refrain from indulging in harmless drinks.

What applies to soda water applies with equal force to every beverage that is dispensed at the fountain, and while "soda" is an absolute necessity in a successful fountain business, it is frequently an item of minor importance as a source of revenue, being outsold by a special popular drink like ginger ale, mead, celery phosphate, koumiss, etc. Experience seems to indicate that each dealer should have a specialty, and the phenomenal success of some of the above certainly speaks volumes in favor of specialties, and that success again emphasizes what the writer has already stated, that uniformity in beverages is of the utmost importance. Uniformity can only be attained approximately where a beverage is drawn with a sirup, as the eye is depended upon to measure the sirup, and it simply insures less uniformity in proportion to the increased number of attendants at the fountain. On the contrary, a special beverage, like ginger ale, is made by weight and measure, then charged in the fountain and drawn complete, and uniformity is of necessity attained. Ginger ale becomes more popular each season, while the lives of sirup-made drinks like the moxies and the maltos are principally distinguished by their brevity and their lack of ability to fill the bill.

There is another feature of the soda water business that unfortunately is almost universally overlooked, and that is the metallic contamination liable to occur in the carbonated water while standing in the fountains and coolers. We buy these containers lined with tin in some shape, and that tin will not last forever. Do not leave the discovery to your customer that it has given out. Do not wait until he tells you that your soda leaves a queer taste in his mouth. Do not wait until he tells you that your soda water made him ill. Do not wait until you are sued for damages, but rather be ever on the alert, make weekly or monthly inspections, drawing a little carbonated water and dropping into it a crystal of yellow prussiate of potash. A change of color will satisfy you at once that something is wrong. Search for it, find it, or stop drawing soda water, as you will have otherwise attained the highest point you will reach, and your trade, instead of increasing, will certainly and rapidly leave you. I have known instances of copper contamination in an apparatus that was supposed to have no brass or copper about it. Once it was a copper cooler tinned outside and inside, and sold as a solid block tin can cooler, a thing that does not exist. Again, the contamination was traced to a brass coupling, originally tinned, but from which the tinning had been worn off. I have known new apparatus to yield contaminated water through one of the parts having been put in without tinning, undoubtedly unintentionally, but the result to the business would have been just as disastrous had it not been for proper care and watchfulness.—*Pharmaceutical Era.*

Is the Earth in Danger from the Drill?

Prof. Joseph F. Jones answers, in a recent issue of the *Popular Science Monthly*, the question, "Is it safe to drill the earth too much?" The professor assumes the earth to be a hollow sphere filled with a gaseous substance, called by us natural gas, and he thinks that tapping these reservoirs will cause disastrous explosions, resulting from the lighted gas coming in contact with that which is escaping. He compares the earth to a balloon floated and kept distended by the gas in the interior, which, if exhausted, will cause the crust to collapse, affect the motion of the earth in its orbit, cause it to lose its place among the heavenly bodies, and fall in pieces.

Another writer thinks that drilling should be prohibited by stringent laws. He, too, thinks there is a possibility of an explosion, though from another cause. Should such a disaster occur, "the country along the gas belt from Toledo through Ohio, Indiana, and Kentucky will be ripped up to the depth of 1,200 ft. or 1,500 ft., and flopped over like a pancake, leaving a chasm through which the waters of Lake Erie will come down, filling the Ohio and Mississippi valleys, and blotting them out forever."

Still another theorist has investigated the gas wells with telephones and delicate thermometers, and he announces startling discoveries. He distinguished sounds like the boiling of rocks, and estimated that a mile and one-half or so beneath the Ohio and Indiana gas field the temperature of the earth is 3,500°.

The scientist says an immense cavity exists, and that here the gas is stored, that a mile below the bottom of the cavity is a mass of roaring, seething flame, which is gradually eating into the rock floor of the cavern and thinning it. Eventually the flames will reach the gas, and a terrific explosion will ensue.

An Evil under the Sun.

The *Southern Lumberman* thinks that one of the most prolific sources of patent lawsuits is the use of mechanical or technical terms and expressions by alleged patent attorneys that may mean nothing or may be construed two or more ways. As a general rule, mechanics and inventors are not thoroughly versed in law English as it is written, and will sign specifications containing words and expressions the legal meaning of which they do not fully understand. Many of the so-called patent attorneys, who write the specifications which form a part of every application for letters-patent, are not at all familiar with the real meaning of the terms they use, and not one in a dozen is a practical mechanic. A few years' experience as an "examiner" in the Patent Office is considered equal to a graduating diploma from the greatest technical school on earth. A sap-headed son of a politician may get a situation as "examiner" and be discharged for incompetency, but, all the same, he will advertise himself as a "solicitor," and the most prominent line in his "ad." will be: "formerly examiner in the Patent Office." This fellow might, perhaps, have presided for a while as "examiner" of "hay rakes" in the division of agricultural implements, and yet he will charge and collect a fee from a poor inventor for writing the specifications for the most complicated woodworking machine or the latest electrical invention with fewer conscientious scruples than an army mule would feel in eating a peck of stolen oats. Some philanthropist could do the mechanical world a favor and win a claim to a starry crown in glory land by publishing a dictionary of mechanical terms in handy, cheap, pocket style, giving brief and accurate definitions of every word and term as construed by the courts.

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A SIMPLE AIR BATH FOR LABORATORY USE.

T. O'CONOR SLOANE, PH.D.

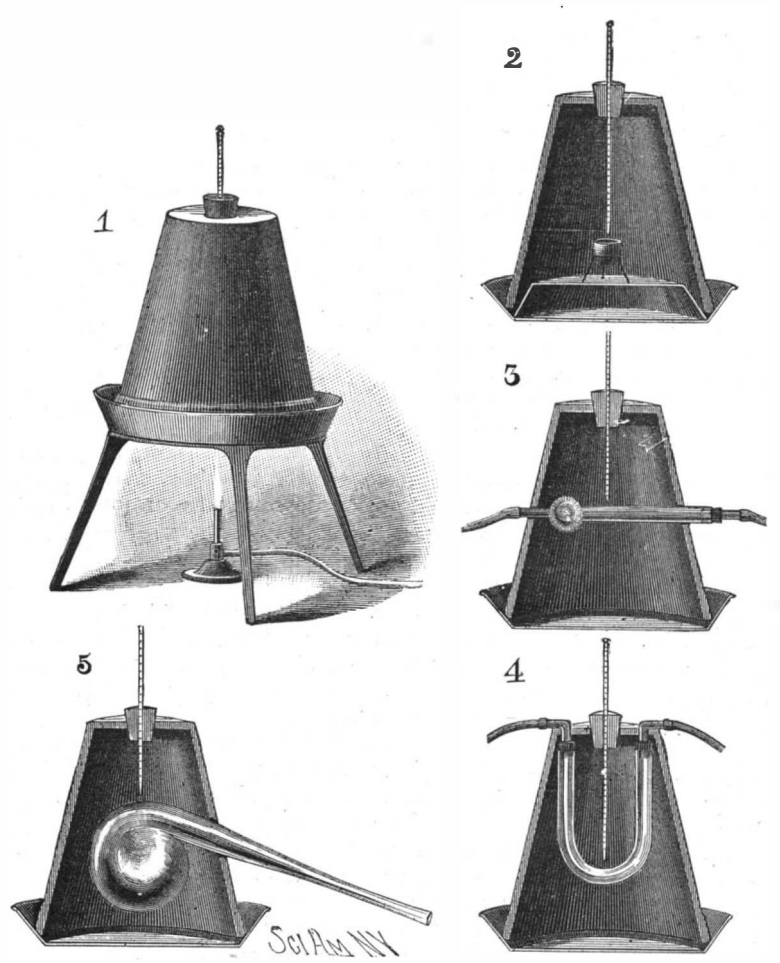
The air bath ordinarily used in chemical laboratories for drying precipitates, for making determinations of water by loss, and for similar purposes, is usually a rather expensive piece of apparatus. The iron or copper closet, with its door, tubulure for thermometer, shelves, stand, etc., works no more satisfactorily because of its somewhat elaborate or difficult construction. In the cuts is shown a simple substitute for this apparatus, that as regards simplicity cannot well be excelled, while its other good features certainly operate to commend it. It consists of an inverted flower pot sustained upon an ordinary tin pan or sand bath, the whole being carried by a tripod or retort stand. The aperture at the top serves to receive a perforated cork, through which a thermometer is passed. An ordinary Bunsen burner is used to heat it. As the sand bath directly over the burner becomes very hot, it is advisable to invert a second smaller sand bath within the first, as shown in Fig. 2. This prevents too direct a radiation of heat from the hot metal. Upon this the little stand or bent triangle supporting the crucible or watch glass containing the substance to be heated may be placed. The thermometer should be thrust down through the cork until its bulb is near the substance to be dried, so as to obtain a correct indication of the temperature at that point. The entire arrangement is shown in external view in Fig. 1.

To place a vessel in it or to remove one, the flower pot is lifted off the sand baths. It will be observed that its porous nature provides a species of ventilation, while its composition assures it against corrosion. It even protects the plates below to a considerable extent, as drops of water or other fluid cannot run down its sides as it cools.

But convenient as it is in the role of air bath for simple drying operations, it will be found more so where drying tubes or retorts have to be manipulated at constant temperature. The flower pot can be perforated at any place, and holes of any size or shape can be drilled and cut through it with an old knife, file, or other implement. Thus in Fig. 3 it is shown in use for drying a substance at constant temperature in a straight drying tube. The holes to receive this tube can be drilled in a few minutes. The arrangement as shown is of the simplest kind, but if the usual bath was used, it would require a special tubulation to be introduced or contrived for the tube to pass through. Flower pots cost so little that there need be no hesitation in preparing them for special uses.

In Fig. 4 a U tube is shown as being heated, while in Fig. 5 a retort occupies the bath, and is in use for fractional distillation or other operation requiring a constant temperature. In all cases it is better to use the second bath inverted within the chamber. It conduces greatly to the maintenance of an even temperature throughout the whole space. A hint may also be taken from the heavy drying plate formerly perhaps more used than at present. If for the light metal pans a heavy plate one-eighth inch or more in thickness is substituted, the temperature will not be subject to as rapid variations, and less difficulty will be experienced in keeping a constant temperature. The tray furnished with the next large size of pot may be used instead of the sand bath upon which to rest the inverted flower pot. This gives an absolutely non-corrodible construction.

When the bath is in use for drying substances, its top, which is at a rather low heat, affords an excellent place for drying precipitates wrapped in their filter papers. It acts in two ways. It is generally just hot enough to dry them with reasonable quickness without danger of spurting, and it also acts by capillarity to absorb the water directly. It represents in the last respect the porous tile or blotting paper—appliances too little appreciated by chemists here. It must be remembered that the drying of a precipitate by evaporation leaves all the impurities of the wash water concentrated therein, while capillary absorption removes a great part of both wash water and its impurities, thus conducing to the accuracy of the work.



A SIMPLE AIR BATH FOR LABORATORY USE.

THE *Medical Record* says: The alkaline bichloride treatment of yellow fever, as suggested by Dr. Sternberg, was carried out during the epidemic at Jacksonville, and Dr. Sollace Mitchell reports that it was very effective. The formula finally used was:

℞. Sodii bicarbonat..... gr. x. –lx.
Hydrarg. bichlorid..... gr. ¼.
Aquæ puræ..... ʒiv.

M. Sig.—Give ice cold every hour during the day, and every two hours during the night.

The bichloride has a powerful diuretic effect on the kidneys, lessening the albuminaria. The alkaline corrected the acidity of the intestinal contents.

Cavalry Riding Drill.

The first riding lesson usually takes place in the "riding school," where, as the floor is covered with "tan," the recruit who comes off will fall softly. The military authorities don't want their recruits laid up in hospital. The first lesson consists of leading the horse around the riding school; so that the axiom of learning to creep before walking is slightly modified here, for the recruit learns to walk his horse before riding him. When he has led his horse around for a while, the horse's head is brought in from the boards (*i. e.*, the walls of the school), and the recruit is taught to "stand at ease" and to step from side to side of his horse's fore feet in measured paces. Then comes the "mount;" and usually the unfortunate recruit has no sooner got up on one side than he rolls over on the other, owing to the vagaries of his horse, who knows that he has a recruit in hand and takes advantage of it. Presently the order is given to "march;" and away file the horses around the school walls, many of the recruits thinking that horseflesh is very perverse in rubbing its side against the school wall with the recruit's leg for a buffer. The day when I got my first riding lesson many of us started off by pulling on our horses' mouths, and got (to quote our rough rider) "all over the shop like a pack of sheep." After a few turns round—during which the "rough" taught us the aids to horsemanship in the preliminary stages of the "walk"—we learned that we were not to "pull our horses' heads off," but to handle the reins gently by feeling them with our wrists and not with our whole arms. All we had to do (we were told) was to sit there and keep our bodies upright with our chests forward, by hollowing the back and drawing in our stomachs, as well as to keep our "chins off our stocks" and our heads up.

We began to see that learning to ride was no trifling job. When it came to fixing our legs, getting them well back, raising our toes and sinking our heels, we got more to do than we ever bargained for. Your teacher is a hard man to please; and I'm sure that by sheer practice recruits at Canterbury have got all their stomachs pressing up against their diaphragms. Otherwise how do they muster such small waists and such pigeon-like chests? The fact is that lungs, heart, liver, stomach, and spleen are all packed together chestward, like a tin of Australian mutton. Whether nature ever intended such cramming is a question that the military authorities don't study. Make your men as wooden as possible—never mind nature—is their dictum; and certainly they are listened to. After we had done a little walking around the riding school, we got more confidence; and thought, no doubt, that we should like a bit of a "trot," just to see what that was like. When it did come to trotting many of us fell off, or nearly fell off, and we went hobbling around the school—to quote our rough-rider again—"like a lot of stuffed dolls riding yer horses from nose to croup." And certainly many of us were more often on our horses' withers and haunches than on the center of their backs, and we had our arms more often round their necks than holding our reins. The "rough" called us to a halt, and even here we were at fault. Some of us pulled too much, or we pulled too little, or we pulled awry, with the result that our horses were "all over the shop." When at last we had stopped, our friend the "rough" again let us know a bit of his mind about our first appearance as cavalrymen. He "never saw such a bloomin' lot of asses in all his born days; my old mother could ride better than you," etc. He had probably told the same yarn to generations of recruits; but really we believed that we were a set of out-and-out duffers.

After a few months' riding drill the cavalryman learns to ride his horse at all paces; and when he can take him through the turns, circles, and windings of the *ménage* drill, and knows how to use his "arms" mounted, he is fit to call himself a real cavalryman, and is ready to go and fight his country's wars when he gets the chance. If the reader wants to learn more of cavalry equitation, he had better join. A few months' drill will teach him all that he will care to learn.—*St. James's Gazette.*

Coloring of the Steam Jet.

The following notes on the phenomena of the steam jet are contributed by Von Helmholtz to *Wiedemann's Annalen.* In the course of his experiments he noted that a jet of steam escaping from a hole of one or two millimeters diameter, lighted obliquely and observed upon a black background, is invisible at the lower extremity, and presents toward the top the well-known whitish appearance. This aspect may be modified in many ways. If an electrified point is brought near the steam, the jet immediately becomes azure blue, or, according to the power of the electrical machine, purple, red, yellow, green, etc. These tints are intimately connected with the dimensions of the liquid drops, and hence it follows that the electrical point has the power of provoking condensation of the supersaturated vapor which is found at the lower part of the jet. The same result is obtained by bringing near to the steam jet a platinum wire made incandescent by an electric current, or silver, iron, copper, or brass wires simply made red hot in a flame, or even glass heated below the red, or an organic matter, wood, paper, etc., in a state of slow combustion. The products of any flame whatever, with the exception of the flame of pure alcohol, directed upon the jet steam by the aid of a chimney or by simply blowing, produce a very energetic effect. Finally, traces of certain chemical substances introduced into the steam jet cause the same modification. Among these are hydrochloric and nitric acid; but concentrated sulphuric acid especially shows the phenomenon. It is known that solid dust particles provoke the condensation of supersaturated vapors, but their presence cannot be invoked here to explain the preceding facts.

Helmholtz is of opinion that they may be attributed to a molecular concussion, the effect of which may be compared to that of mechanical concussion upon superheated or supersaturated liquids. A flame, for example, is the scene of closely approximated and extremely varied movements, and the chemical atoms which are incessantly passing in it from one combination to another are found in every kind of unstable condition. These movements and changeful states of equilibrium leave their traces in the products of combustion at a certain distance from the flame properly so called, and determine the observed phenomena. The luminous effect produced as the extremity of an electrified point and the presence of ozone in its vicinity show that this point is the cause of concussions comparable to those provoked by active combustion, and the analogy between the two phenomena is found again in the fact that they both furnish means for making electricity pass through gas. As to solid incandescent bodies, they can act either through the emission of solid particles from their surfaces or by the chemical concussions which they communicate to the surrounding gases.

A Far-sight Machine.

Mr. Edison is reported, in a conversation with a reporter who solicited his ideas on the subject of the projected world's fair in New York City, as saying that he would take an acre of space in such a fair and completely cover it with his inventions, of which he has no less than 70 now under way. "One of the most peculiar, and now promising good results," said Mr. Edison, "is what I may call a far-sight machine." By means of this extraordinary invention, the *Electrical Review* says, he hopes to be able to increase the range of vision by hundreds of miles, so that, for instance, "a man in New York could see the features of his friend in Boston with as much ease as he could see a performance on the stage. That," he added, "would be an invention worthy a prominent place in the world's fair, and I hope to have it perfected long before 1892."

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RECENTLY PATENTED INVENTIONS.

Railway Appliances.

CAR COUPLING. — Abner J. McGehee, Jackson, Tenn. This invention covers a novel construction and arragement of parts, making a simple and effective coupler designed to operate automatically, and one which will not be liable to become accidentally uncoupled.

EXTENSIBLE CAR STEP.—James F. and John F. Wood, Wilmington, Del. This step is mounted in ways secured to the under side of the permanent car steps, the extensible step being normally held in position just beneath the lower car step, but arranged so that the steps may be extended downward to form a continuation of the permanent steps.

SWITCH.—George L. Worth and John B. Wyatt, Wymore, Neb. This is a three-throw open split switch, employing only one pair of main or outer switch points, the main switch points being normally open with the main line clear, and at the same time permitting trains on the sidings to pass out of either side track on to the main line without operating the switch.

BRAKE. — James K. Hardwicke, Marshall, N. C. According to this invention a rotary shaft extends from end to end of a train, and is coupled between the cars, the brake frames having a screw-threaded connection with the rotary shaft, and the hand brake mechanism of the several cars being geared with the rotary shaft, with other novel features, whereby an entire train may be braked from the tender.

SAFETY GATES. — William M. Brown, Jr., Sacramento, Cal. This invention consists in mechanism for operating safety gates inclosing the platforms of cars to prevent passengers from falling off, and provides an apparatus therefor controlled and operated from the engine of the train.

Electrical.

INCANDESCENT LAMP.—James Stewart, New York City. Combined with the carbon filaments and wires attached thereto is a clamping device for holding the wires in contact with the conductors of the lamp socket, with other novel features, the construction being such that the carbon filaments may be removed and replaced without injury to the lamp globe or socket, permitting the renewal of worn-out lamps at a slight cost.

ELECTRICALLY HEATED VACUUM PAN. —Gail B. and Milbank Johnson, Elgin, Ill. This pan is more especially designed for use in condensing milk, and has a rounding jacketed bottom, an insulating heat-conducting material within the jacket, an electric resistance wire passing spirally around the jacketed space and inclosed in the material, while a horizontal coil of pipe within the can contains an electric resistance coil.

Mechanical.

LOOM ATTACHMENT. — Fred Lacey, Adams, Mass. This invention relates to an attachment for looms upon "splits" or more than one width of cloth are woven at the same time, the object of the invention being to produce center selvedges, and the invention covering a novel construction and combination of parts.

LOOM. — Joseph Jagger, Glenham, N. Y. This is a loom for weaving Brussels velours, the invention consisting of a section wheel operated and locked from the main shaft and connected with cams and levers operating the healds, the jacquard, and the picking devices, together with a device for insuring regular measurement of each pattern woven.

Miscellaneous.

FENCE.—John M. Fellows, Burlington, Ind. The posts are connected with cross sills having a vertical mortise therefor, a brace also connecting the post and sill, making a substantial fence which can always be kept plumb, irrespective of unevennesses of the ground surface, and which may easily be removed and set up elsewhere.

AIR PURIFIER.—Benjamin S. Benson, Baltimore, Md. This invention relates especially to means for purifying the air of sick rooms or sleeping rooms, and consists in extracting the poisonous moistnre and gases by forcing the air in contact with antiseptics, the invention covering a filtering case with detachable filtering webs, air inlets and outlets, a heating case or drum having a hot air chamber, and various novel features of construction and combinations of parts.

SCARF FASTENER.—Carl Strauss, New York City. This device consists of a spring clamp with pivoted tongue, slotted spring plate, and a base plate having a spread flat portion provided with stitching perforations, the device being designed for use in connection with scarfs having a portion of the shirt bosom exposed by the vest of the wearer, and preventing the scarf from riding up or getting out of place.

WHEEL. — George E. Crutchfield, English, Ark. This is a wheel of superior strength, wherein the hub extends to within a short distance of the felly, and the spokes are short, the invention providing a simple and efficient box for the wheel, and the tire being so made that it will serve for both tire and felly.

VEHICLE SPRING.—George E. Bartholomew, New Haven, Conn. Two pairs of leaf springs are connected to the hind axle and to clips secured to the under side of the vehicle body, the two springs of each pair being held under tension by a central link to prevent rattling, and each pair of springs being connected to a central spring bar, the object being to dispense with the ordinary forms of platform or elliptic springs.

VEHICLE SPRING. — Edward Hutchinson, New York City. This is a spring especially adapted for attachment to a head block and the support of side bars, the spring being designed not to strike the head block or be compressed to a disagreeable extent when the weight of a person mounting is brought to bear upon one side.

HEAD BLOCK FOR VEHICLES.—This is also another invention of the same inventor, providing a combination of head block, fifth wheel, and springs, whereby the body of the vehicle is allowed to drop a greater distance than usual, the peculiar shape of the head block and perch plates allowing the fifth wheel to be secured to the under side of the head block.

STOVE PIPE THIMBLE. — Alexander Staub, Fort Wayne, Ind. This thimble is constructed with cast iron annular heads, held together with the rest of the thimble by wires or thin metallic strips, the construction being such that the heads will be held firmly in place and not become loose, while the thimble may be readily put together and taken apart, and can be adjusted in length.

PHOTOGRAPHIC CAMERA. — Erastus B. Barker, Newark, N. J. This invention consists in novel means for using the sensitive plate of greater length than width, as usual, so as to give either a longitudinal or transverse exposure, without restriction to the angularity of the plane in which the plate holder lies.

GROUND GLASS ATTACHMENT FOR CAMERAS.—Max Bauer, Brooklyn, N. Y. A back frame is provided with springs secured thereto, a ground glass being secured to the ends of the springs, the latter supporting the ground glass on the back frame of the camera, at the same time holding the plate holder in place, the springs being out of sight, and the whole presenting a neat appearance.

BROWN LEATHER.—Edward Frid, New Hamburg, N. Y. This invention covers a compound for cleaning and restoring to its original color all kinds of brown leather, such as russet boots and shoes and harness, and has an acid which removes all stains and discoloration, mixed with a coloring agent dissolved in boiling water.

METALLIC SHINGLE. — Joshua Mills, Ottawa, Ill. This shingle has a triangular rib at each longitudinal side, the edge of one rib being carried horizontally inward and the edge of the other rib horizontally inward and vertically, the object being to check the effects of a driving wind and to secure the shingles without perforating or otherwise puncturing them, dispensing with the necessity of soldering.

PRESERVING LUMBER. — Thomas H. Sampson, New Orleans, La. This invention is to facilitate the use of woods now useless for furniture making, and prevent their warping and twisting, and consists in first removing the sap, then dissolving the cellular tissue by an alkaline solution and extracting it by a vacuum, precipitating the remaining matters in the wood in an insoluble state by a basic metallic salt, and drying.

WINDOW CLEANER. — Henry C. Rose, Leadville, Col. This is a fountain device for cleaning windows without removing the curtain or draperies, and has a framing with a water receptacle at its upper end, a jet tube, and an elastic roller journaled in the sides of the frame, arranged to normally close the apertures in the jet tube, a receiving chamber being arranged below the roller.

CALF WEANER. — Ernest H. Geisler, Deshler, Neb., and Moses Simpson, Monden, Kan. This weaner consists of a number of wire rods bent to form a halter-like frame and united at a point near their forward ends, the wires being extended forward beyond the point of their connection to form prongs, the weaner being readily fastened in place and removed when desired.

OIL WELLS. — John P. Firth, Titusville, Pa. This invention consists of a receptacle having openings and held to slide in the rock, being connected by a conducting pipe with a steam supply to discharge steam on the oil rock, for removing the gummy matter and other substances, thereby permitting a free flow of oil and increasing the production of the well.

RIBBON HOLDER. — Osborne E. Sully, Spencer, Iowa. This holder is formed of a single piece of wire comprising a middle part and having longitudinal arms, straight sides, and springs formed on the sides, and provided with trnnnions projecting inward from the springs, the invention being an improvement on a former patented invention of the same inventor.

SUPPORTER FOR BELTS. — Louis Sanders, Brooklyn, N. Y. This is a device capable of expeditious attachment to or detachment from a pair of trousers at the waistband, and passing over a belt, when worn with the trousers, to prevent the belt from sliding upward above the waistband.

BOX END. — John F. Simpson, Foster Park, Fla. This invention particularly relates to the end pieces of boxes used for packing and shipping oranges, etc., and provides means whereby narrow or small timber may be used, and a better hold secured for the nails which hold the sides and ends of the box together, while splitting is avoided, and a more convenient means afforded for handling and ventilating the box.

COAL AND WOOD CABINET. — Henry Brandt, Brooklyn, N. Y. This is designed as a convenient piece of furniture for the kitchen, store, or elsewhere, and has a coal bin, a communicating coal delivery chamber, with a dust outlet and valve, and other novel features, to supply fuel for making and replenishing coal fires, while being a simple, cleanly, and serviceable structure.

CHIMNEY COWL. — Isaac J. Turner, Princeton, N. J. Combined with a number of outwardly swinging doors located on the cowl for the escape of down draughts is a deflector arranged within the cowl for directing the down draughts to the doors, the chimney flue having a contracted top, over which a cover is placed in close proximity, the outer flange or casing extending around the mouth of the flue.

NEW BOOKS AND PUBLICATIONS.

PROFIT SHARING BETWEEN EMPLOYER AND EMPLOYEE. By Nicholas Paine Gilman. Boston and New York: Houghton, Mifflin & Co., The Riverside Press, Cambridge. 1889. Pp. x, 460. Price $1.75.

This work, from its very full treatment of the subject, and its length, cannot well be reviewed in these columns. A very elaborate treatment of the subject is given from product sharing, through the wages system and its various forms, to profit sharing, industrial partnerships, and arguments in favor of the sharing of the results with operators. The experience of different houses is given under their names, a peculiarly interesting chapter being devoted to the Father of Profit Sharing, and his house, M. Leclaire, a Parisian house painter and decorator. In the present day of labor troubles and strikes it is needless to remark on the peculiar appositeness of the appearance of this treatise. It is well indexed, and the printing, paper, etc., are very elegant.

SECOND ANNUAL REPORT OF THE BOARD OF MEDIATION AND ARBITRATION OF THE STATE OF NEW YORK. Albany: The Troy Press Company, Printers. 1889. Pp. 434.

In the same line with the work just reviewed comes this report upon the labor troubles of the State of New York. It consists of a transcript of the testimony given before the State Board by different experts in industrial affairs, and contains a large amount of interesting matter referring to trade troubles as recited by witnesses viewing it from different standpoints furnished by their personal experiences.

ANNUAL REPORT OF THE HEALTH DEPARTMENT OF THE CITY OF BALTIMORE. For the fiscal year ending December 31, 1888. Baltimore, 1889. Pp. 286.

This report is made up of tables regarding the death rate and diseases of the different classes of the population, forming a valuable contribution to the census of health.

A THEORETICAL AND PRACTICAL TREATISE ON THE STRENGTH OF BEAMS AND COLUMNS. By Robert H. Cousins. E. & F. N. Spon. New York, London. Pp. ix, 170. Price $5.

This book is devoted to formulæ for the determination of the strains that beams and columns of all classes are subjected to in construction. In bringing up to date the science of the strength of materials in this division, and in discarding much of the old and unpractical, a good service is done. Calculus is made sparing use of, most of the formulæ being based on algebra only. Diagrams are given when necessary to elucidate the text. An index and full table of contents complete the work.

THE NONPAREIL SYSTEM OF HAND RAILING. By John V. H. Secor. New York: Office Publishing Company. 1889. Pp. ix, 78. Price $2.

In this work, Mr. Secor, who is a practical stair builder of long experience, has explained the methods which he has used for laying out hand railing. The method of ascertaining the length of the mould and the system of bevels used by the author are presented in the shortest possible style, and the work will be a contribution of value to the library of all progressive builders. The work is illustrated by cuts, is preceded by a glossary of terms, and an index is given at its end.

ELEVENTH ANNUAL REPORT OF THE STATE BOARD OF HEALTH OF THE STATE OF CONNECTICUT. For the year ending November 30, 1888. New Haven. 1889. Pp. xiv, 360, 200.

In this work are bound together the general report and the report of the Bureau of Vital Statistics. The latter is principally tabular, and contains a large amount of very valuable and carefully expressed statistics arranged in full detail. The State Board report is of value from the special reports contained in it by experts upon such subjects as the health of towns, pollution of rivers, Bridgeport sewer age, public sewers of New London, etc. The work comes up to the high standard which the health board reports of this State have in the past attained.

THE PRACTICAL OSTRICH FEATHER DYER. By Alexander Paul. Revised and corrected by Dr. M. Frank. Published by Mrs. Dr. M. Frank. Philadelphia. 1888. Pp. ii, 190. Price $10.

The titular subject is very fully treated in this work, and it is easy to believe that the desired information for any class of coloring can be obtained from it. In addition to the text a quantity of dyed ostrich feather filaments are bound into the work, in order to illustrate fully the results obtained by the different formulæ. The work will be indispensable to the intelligent dyer, and its character throughout is eminently practical. Several illustrations of apparatus, etc., are given.

HOG CHOLERA. Its history, nature, and treatment, as determined by the inquiries and investigations of the Bureau of Animal Industry. Washington: Government Printing Office. 1889. Pp. 193.

This is a publication by the Bureau of Animal Industry, containing the results of experiments conducted by the chief of the bureau, Dr. D. E. Salmon. The experiments definitely determine certain facts in regard to the contagiousness of the disease, bacteria, readiness of cultivation of the germ in various media, modes of checking outbreaks, rendering infected premises safe, etc. The book is illustrated by 16 colored plates. It is a work which should be possessed by every one interested in this kind of stock raising.

PSYCHOLOGY AS A NATURAL SCIENCE. By C. G. Raue, M.D. Philadelphia: Porter & Coates. 1889. Pp. 541.

This work is devoted to an exhaustive review of the hypnotic state, mesmerism, and all the unexplained psychological phenomena now so much discussed. It is divided into six sections, each subdivided again. Opening with the intellectual sphere of the mind, and beginning with the senses, the work goes systematically through the entire range embraced by its very suggestive title. Somnambulism occupies considerable space, while occult phenomena, such as clairvoyance or second sight, action at a distance, etc., have an entire section devoted to them, and toward its end the entire subject of phantasms of the dead and haunted houses is treated. While the book lacks an index, a very full table of contents in great part supplies that want.

HOT WATER HEATING, OR WARMING BUILDINGS BY HOT WATER. By William J. Baldwin, M. Am. Soc. C. E. New York: *The Engineering and Building Record.* 1889. Pp. 385. Price $4.

This work treats in very full detail of the different methods of heating houses by means of hot water. The subjects of the laws of hot water circulation, motion in pipes, methods of finding the flow of water in the pipes of an apparatus, and special forms of apparatus for manipulation of pipes are all treated. Many points in practice, such as the use of long radius special elbows for preventing resistance to flow, are given. The direct radiating surface for buildings and how to find it, with Mr. Hood's and others' experiments, are given. The different forms of boiler on the market are spoken of, each under its name, with automatic door and damper regulators and special fittings. Toward the end the method of testing radiators, etc., scientifically is given. 193 illustrations are contained, and add very largely to the attractiveness of the book. An index closes the work.

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4. Perspectives and floor plans of an elegant residence at Bell Haven Park, in Greenwich, Conn. S. Edwin Tobey, Boston, Mass., architect.
5. A mountain cottage lately erected at St. Cloud, Orange, N. J. Elevation and floor plans. Architect Mr. Arthur D. Pickering, New York.
6. A dwelling at Springfield, Mass. Plans and perspective elevation. Cost eight thousand five hundred dollars.
7. Engraving showing perspective elevation of a cottage erected at Roseville, N. J., at a cost of six thousand seven hundred and fifty dollars. Floor plans. F. W. Ward, architect, New York.
8. Illustration and floor plans of a combined school house and country cottage erected at St. Cloud, Orange, N. J. Arthur D. Pickering, New York, architect.
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10. A cottage built at Roseville, N. J., for six thousand seven hundred and fifty dollars. Elevation and floor plans.
11. A cottage at Holyoke, Mass., lately erected for Howard A. Crafts, at a cost of three thousand one hundred dollars.
12. View of Auburndale Station, Boston and Albany Railroad, with plan of station grounds. H. H. Richardson, architect.
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Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 28.

Rotary veneer basket and fruit package machinery. I. E. Merritt Co., Lockport, N. Y.

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(858) S. G.—1892 and 1896 will be leap years; 1900 will not be a leap year. After that the succession will be regular for many years.

(859) G. A. C. asks (1) for a good receipt for a blacking for ladies' shoes. A. Mix a filtered solution of 80 parts shellac, in sufficient alcohol, with 3 of wax, 2 of castor oil, and a sufficient quantity of pigment, such as best lamp black or drop black. It must be kept corked. 2. A practical receipt for making cake stove polish. A. Compress the best graphite or plumbago into cakes by hydraulic pressure. 3. A first class receipt for a polish for furniture, pianos, etc.? A. Melt two or three cubic inches of gum sandarac, add 1 pint of boiled oil, and boil together for 1 hour; while cooling add 1 drachm Venice turpentine and dilute according to judgment with oil of turpentine. 4. A good receipt for liquid glue, that will mend china, wood, metal, etc. A. Dissolve best glue in hot acetic acid, or having dissolved it in water add nitric acid; for the last use 1 quart of water, 2 pounds glue, and 7 ounces acid, adding the latter slowly. 5. A first class washing powder that will foam and form suds when put into water. A. Dry soap, and pulverize it. 6. A good receipt for making a shaving soap that will give a good lather. A. Consult our SUPPLEMENT, Nos. 258, 308, 328, 330, and 360 for articles on soap. 7. A receipt for a good, durable black writing ink and a black indelible ink for marking linen, etc. A. For inks of all kinds we refer you to our SUPPLEMENT, No. 157. 8. Also a receipt for a very dark bluing water for washing clothes. A. Dissolve Prussian blue in water containing ferrocyanide of potassium in solution.

(860) J. B. W. asks for a receipt for making a black paint or enamel that will stand heat, for enameling a small engine boiler and fire box. A. Use shellac and alcohol mixed with best black. This will stand a considerable degree of heat without being destroyed, and after it has lost its good appearance it is easily renewed. Or you could apply a black oil japan ground, such as the following: Asphaltum 3 parts, boiled oil 128 parts, burnt umber 8 ounces. This will require heat from 250° to 300° to make it dry. It may be heated in an ordinary oven.

(861) F. P. A. asks (1) which are the best batteries to use, and how many do I need for a 3 candle power incandescent lamp (Edison)? A. Six bichromate cells will operate your lamp very well for temporary use. 2. I have an electric door bell; had it with one Novelty Disque battery; but thinking it a little weak, I connected it with another of the same kind, and soon after the jar cracked, and rendered it useless. Can you explain why it cracked? A. The cracking of the jar is only a coincidence. The jar may have cracked from one of a dozen reasons.

(862) F. C. H. writes: 1. Suppose a house in Newton Center and a house in Newton Corner were supplied with gas and water, could the water pipe be used as one telephone line and the gas pipe the other, or would they be short-circuited in the earth? A. As both of the pipes are thoroughly grounded, we think it would be impossible to secure a telephonic circuit by the means suggested. 2. Can a magneto be made to ring a common electric bell? A. An electric bell of high resistance may be operated fairly well by means of a magneto.

(863) F. M. asks what kind of a mixture he can use to coat card or tar board with so that he can write on it with a slate pencil and rub it out same as on the silicate slates. A. Mix 1 gallon 95 per cent alcohol with 1 pound shellac, 8 ounces best ivory black, 5 ounces finest flour emery, and 4 ounces ultramarine blue. Dissolve the shellac first, then add the other constituents. This is a typical formula, and may be varied considerably. The general idea is to use emery or ground pumice stone as the abrading or roughening material, with black coloring matter and alcoholic varnish.

(864) O. K. asks how he can preserve gunpowder in shells from melting into fluid in South America, say in Ecuador during the rainy season. A. As the melting alluded to is due to moisture, your best plan is to use the best quality of powder and coat the shells thickly with melted paraffine. Possibly some of the wood or brown powders would be guaranteed not to melt or deliquesce.

(865) H. J. writes for a receipt for making a good soap, as simple as possible, one that does not injure the skin. I have always plenty of good grease at command, and in hot weather it is offensive if kept too long, and difficult to get rid of. A. Melt down the grease and skim it free from refuse, scrap, etc. Dissolve 1 pound caustic soda in water for every 6 pounds of grease. When the soda solution has cooled add it to the grease, stir thoroughly, and pour into a pan. This soap is a little too alkaline for toilet purposes. After it has stood for a few days shave or cut it up and place in a dish with about 1/4 to 1/2 its volume of water and heat to boiling. The soap will separate in clots. If it does not, add salt until a good separation takes place. Chill it by pouring on a little cold water, pour off the water, and remove the soap. Remelt with a little clear water and cast in moulds, such as tea cups or patty pans. Perfume if desirable, though it is better without.

(866) E. B. S. writes: 1. Can you inform me whether there is such a thing manufactured as shot in small sizes, such as bird shot, in iron or steel, instead of lead? A. Such material is made for and is used by the granite polishers. Any of such could give you further information. 2. Could they be made by the dropping process, the same as shot made from lead? A. It can be so made, but of course would tend to destroy the apparatus used. It is probably best made by a strong air or steam blast which is directed against a stream of molten iron so as to drive it into spray.

(867) W. H. H. asks for a recipe for bleaching ivory. I have a sunshade whose handle has turned yellow, and would like to know how I can whiten it. A. Clean it by rubbing with finely ground pumice stone and water, and wash, and while still moist expose to the sun in a glass vessel. Use a clean pickle or preserve jar. Do not expose directly to the sun, or it will crack.

(868) A. G. asks whether aluminum can be soldered. If so, how to do it? A. The following alloys are given:

a.	Aluminum	8 parts.	Zinc	92	parts.
b.	"	12 "	"	88	"
c.	"	15 "	"	85	"
d.	"	20 "	"	80	"

The aluminum is first melted, the zinc added gradually, finally some fat is added, and the whole is stirred with an iron rod and poured into moulds. For flux use copaiba balsam 3 parts, Venice turpentine 1 part and a few drops of lemon juice. Dip the soldering iron into the same flux.

(869) C. I. F. asks: Would the motor illustrated in SCIENTIFIC AMERICAN of March 17, 1888, be strong enough to run an ordinary size skiff, say 12 feet long, screw propeller, in a stream with very little or no current? A. The motor will run such a boat as you describe.

(870) P. J. W. asks whether or not the banana grows upon a tree. A. The banana plant is fairly denominated a tree, as it exceeds the limit of height generally used to determine shrubs.

(871) J. H. S. writes: 1. What is the process for liming eggs, and how long will they keep in an ordinary, cool cellar? A. To each pail of water add 2 pints freshly slaked lime and 1 pint of salt and mix well. Half fill a barrel with it and place the eggs therein. They will keep, it is said, for two years. For preservation of eggs see our SUPPLEMENT, Nos. 95, 101, 217, and 468.

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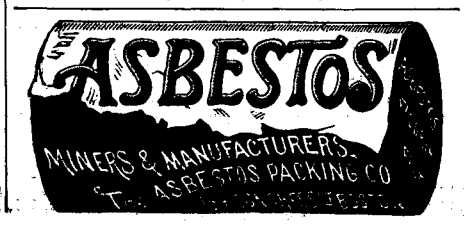

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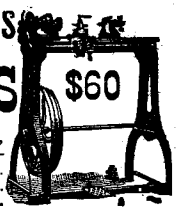

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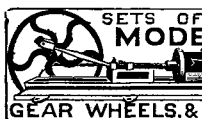

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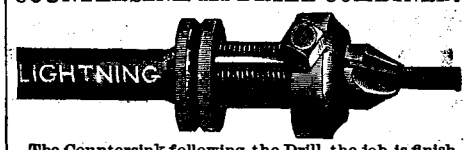

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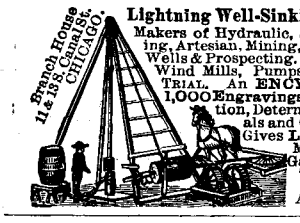

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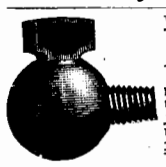

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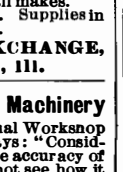

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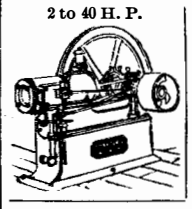

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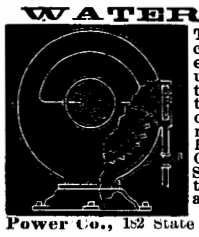

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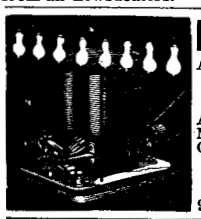

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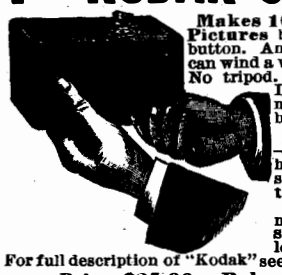

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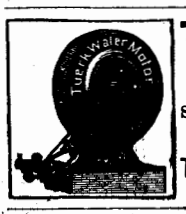

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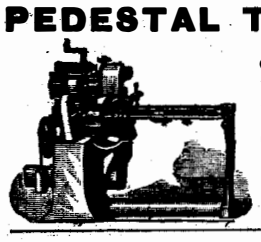

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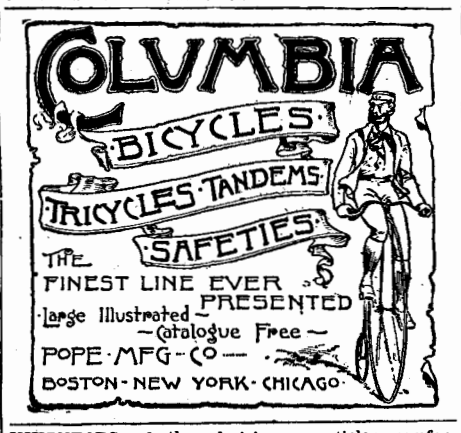

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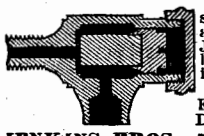

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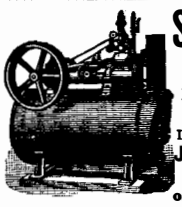

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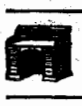

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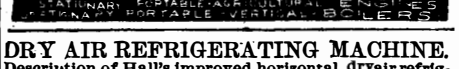

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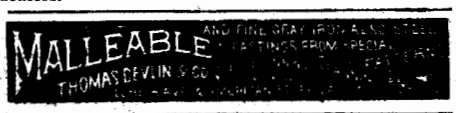

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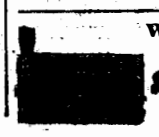

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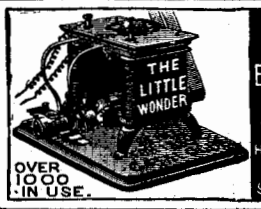

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